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Editorial

Let us get a few matters clear in our minds, to try and reduce the welter of confused ideas that have been current concerning P.M.G. Regulations.

With one main exception—the two class licencing system—the Regulations do not differ materially from pre-war, and certainly the Chief Inspector of Wireless places no different interpretation on them. Nor has his attitude, or that of his staff at Treasury Gardens, changed, towards the Australian Amateur. In some States, however, the interpretation placed on certain Regulations has been startling to say the least.

We have pointed out before, however, that during the settling in period after the war, some patience is necessary. The re-establishment and extension of P.M.G. Administration is a large task, with problems familiar to anyone who is engaged in restoring a business to pre-war activity. Nevertheless, it must be emphasised that the effect of any misinterpretation of a Regulation would have been greatly minimised, and its duration reduced to hours instead of weeks, if the Amateurs involved had used their organisation—the W.I.A.—to handle their case, instead of taking local independent action.

For a quarter of a century, the W.I.A. has had a procedure for handling cases of Hams in some form of trouble when they believed they were "in the clear." The procedure is simply this: If an Amateur receives a direction from a Radio Inspector, which he believes is a misinterpretation of a Regulation, he passes the necessary information to his Divisional Secretary who arranges for suitable representation to be made personally to the local State Superintendent. If no reversal of the instruction is forthcoming, and the Secretary believes the case sound, he sends full details at

(Continued on page 17)

IN THIS ISSUE

V.H.F PORTABLE TRANSMITTER

By G. M. BOWEN, VK5XU*

Some peculiarities encountered using Class B receiving tubes, such as the 1J6G, in Modulated Oscillator Circuits.

The main purpose of this article is to stimulate the reader into contributing his ideas on the subject, however trivial and unimportant he might think them to be. Naturally, the scope of the subject is broad and this article deals with only a few aspects of it, so it is hoped that if the facts and hypothesis presented herein do not agree with what the reader has himself found, he will contradict or amend them forthwith.

A 1J6G was chosen because it has a low value of quiescent plate current, high output when driven, 2 volt filament, quick heating for T/R change over, and because its counterpart, the 19, had been successfully used in a V.H.F. transmitter in a meteorological instrument. The 1J6G did the job required of it after the peculiarities associated with its use had been discovered (by the hard way!). Once the relative data had been collected and collated with the valve characteristics, the unusual behaviour of the tube became understandable.

The following figures show the average operating conditions per section of the tube, but it must be remembered that they are only a guide and will be amended in sections of the article.

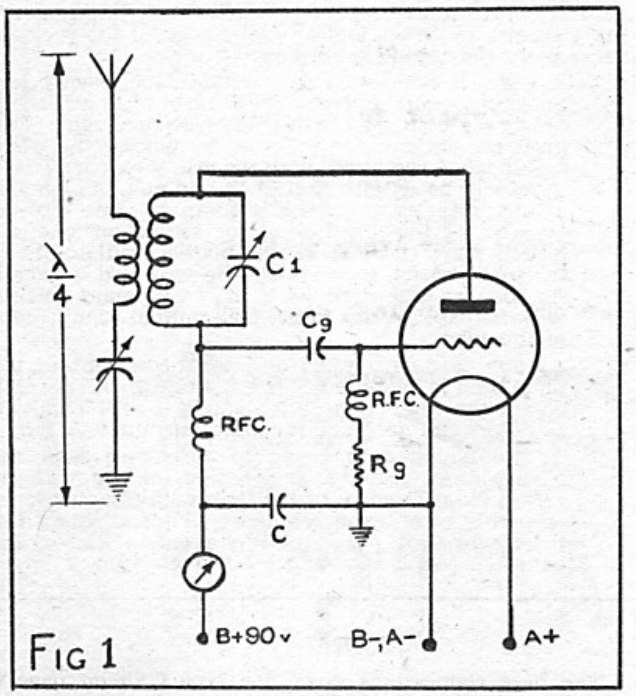


FIG 1

Non-Oscillating

Plate Voltage	90 Volts
Grid Voltage	0 Volts
Plate Current (Zero Signal)	3 Ma.

Oscillating (No Load Conditions)

Plate Voltage	90 Volts
Grid Voltage (R.F.)	25 Volts R.M.S.
Cathode Voltage (Self Bias)	—10 Volts R.M.S.
Plate Current	16 Ma. (per Section)
Grid Current	1.5 Ma. (rect. Grid Current)
Grid Resistance	10,000 Ohms
Driving Power	20 mW. (approx.)

Two circuits were experimented with and will be treated separately. The usual component values were used. Grid resistance was the subject of considerable experimentation and the value for R.F.C. was critical, but once adjusted did not have to be altered for the small frequency coverage involved.

With no load, the above circuit in Figure 1 gave instant oscillations and the following results were obtained from which the conclusions were drawn:—

1—An expected constant average plate current Ip of 32 Ma. for the double triode connection.

2—The value of the grid resistor Rg had a wide effect on the power in the plate tank, and on the degree of frequency stability especially under plate modulation.

3—There is a minimum value for C1 beyond which there must be no decrease or oscillations will cease. The minimum value is necessary to raise the Q of the L1 C1 circuit to a value where the decrement is such, that with the power lost to the grid circuit and the R.F. resistance, the tube still presents a negative resistance to the circuit. The effect of increasing C1 is not linear, and larger values of C1 which give increased power and ensure more stable operation up to a point, result in increased power loss proportional to the square of the R.F. current in the tank circuit.

4—The decrement of an ordinary coil and condenser circuit at V.H.F. is high and consequently the efficiency of the oscillator is low. Resonant lines couldn't be used because of their size.

By applying a pure resistive load across the tank. the circuit decrement increases. Less power within the tank as "flywheel" energy results in less R.F. voltage developed across the circuit impedance. Therefore there is less grid drive and with a Class B triode operating on zero fixed bias, a consequent fall in plate current occurs. There seems to be no critical value of grid resistor which can be chosen to buffer this change, although some measure of compensation will occur by the choice of the right value. A value can be found which varies for individual tubes whereby the plate current can be kept substantially con-

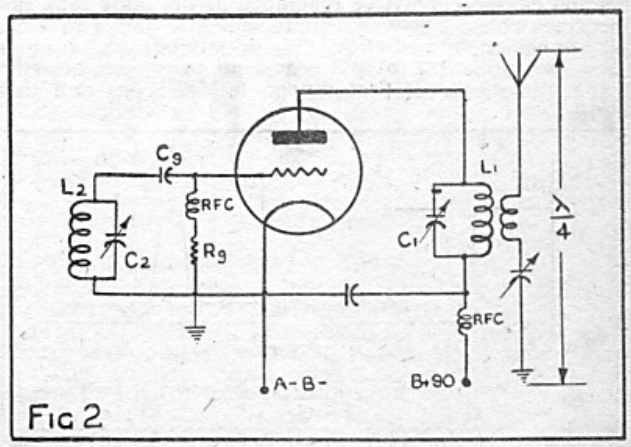


FIG 2

*73 Portrusch Road, Toorak Gardens, South Australia.

stant over quite a big range in tank loading, but it was found that the value was high and resulted in a high negative bias developing, to the detriment of output power with the limited portable battery supply.

If the load is reactive, reflection of reactance into the tank circuit causes frequency change and a loss of power transfer from tank to the output coupling coil. As the antenna is tuned to resonance the loading coil reflects pure resistance into the tank and on the same basis as outlined above, the plate current of the tube falls. That is, the antenna is tuned to resonance by tuning to a dip in plate current instead of a rise.

The TPTG circuit was tried (figure 2) and finally induced to give quite fair results.

Since the grid and plate tank circuits must be near resonance for oscillations to be maintained, another effect appeared which differed from the usual tuning procedure, with no load on the plate tank.

With no oscillations, zero signal plate current of 3 Ma. occurred. Then as C1 was rotated to bring the plate tank into resonance with the grid tank just as resonance was approached from the high frequency side, i.e., C1 was increasing in capacity, plate current dipped and then rose sharply to approximately 30 Ma. again falling sharply to 3 Ma. on the low frequency side of f(r) as the reactance of the plate tank became capacitive and the phase conditions were incorrect for maintaining oscillations. Coincident on the rise of plate current, R.F. appeared in the plate and grid tanks.

As with the ultraudion circuit the application of a pure resistive load caused a fall in plate curent, the fall varying with the load until the load created such excessive damping that oscillations ceased. Since space was a vital factor in the design of the transmitter it was not possible to increase the Q of the tanks by using parallel lines, thus with the natural high decrement of the plate tank, the loading was fairly critical. The decrease in the magnitude of plate tank R.F. could be due to two factors. Firstly (the apparent one), the applied load constituting a parallel resistance across the tank and thus dissipating the R.F. energy. Secondly, the consequent reduced R.F. feed back voltage for grid excitation which lowers the peak value of the plate current impulses and reduces the maintained R.F. oscillations.

The automatic reduction in self bias due to less grid rectification does not fully compensate to maintain the plate current at the unloaded value. It was found that any attempt to provide some measure of compensation by increasing the size of Rg resulted in instability even with B+ constant and a tendency to "squeg" became more pronounced since the tube has a high grid current (see characteristics).

Peculiar conditions occurred when the resistive load was replaced by the antenna. With the antenna off resonance reflected reactance caused detuning of the plate tank, less R.F., therefore less feed back and less plate current. On the other side of resonance the antenna reflection caused capacitive reactance in the plate tank and incorrect phasing between plate and grid tanks so oscillations ceased immediately. As the antenna was brought near resonance (thus approximating to a pure resistive load), plate current first dipped a Ma. or so and then

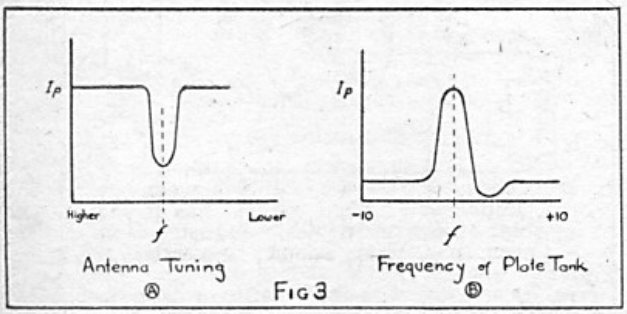


FIG 3

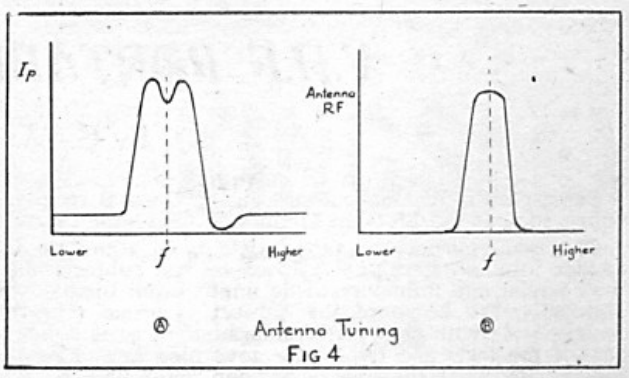


FIG 4

rose sharply to a value which was less than the unloaded value. Then as resonance was reached plate current dipped and the R.F. reached a maximum in the antenna. Passing through f(r) caused a rise again and then a sudden fall as the reflected reactance to the plate tank created incorrect phase conditions for the maintenance of oscillation.

Decreased coupling coefficient between the antenna coupling coil and plate tank made the rise of plate current more pronounced with less dip at resonance. However this looser coupling did not restore conditions to what is expected as normal tuning, and it was concluded that the degree of antenna coupling was not the primary cause of the double humped effect in the plate current curve, as the antenna was tuned through resonance.

After much data had been collected and the whole collated with the tube characteristics, the following summary seemed to be the logical explanation of the peculiar reversal in the tuning procedure:—

1—A Class B tube, such as the 1J6G, has a very low quiescent plate current with zero bias and only draws plate current with grid excitation. Therefore until oscillations are initiated by tuning the plate tank near to resonance with the grid tank (in TPTG) there will be no grid excitation and no plate current of any magnitude. The slight dip in plate current (to about 2 Ma.) will occur for an instant as oscillations start (normal in self biased oscillators). If the bias resistor is small the dip will also be small. As soon as R.F. feed back increases plate current will rise rapidly, due to the high mutual conductance of the tube.

2—As any load is applied and the decrement of the plate tank is increased, less R.F. voltage will develop across the plate impedance and this will result in less R.F. and drive. Thus plate current will fall.

3—As the antenna is tuned to resonance then the change from reactive to resistive loading will increase the decrement of the tank with the maximum occurring at antenna resonance. Thus at this point, there will be a dip in plate current instead of the expected rise due to effect 2 above.

PARASITICS

The base connections given for type CV6 on page 8 of "Amateur Radio" for November, were unfortunately incorrect. The correct connections are as follows:— Heater Nos. 2 and 7. Cathode 8.

The name of the Author of the Article on "Selectivity" (Page 5, November "A.R.") was unfortunately omitted. He was Mr. A. F. Nickson VK3NB.

CLEARING THE ETHER.—Series II, Part VII

By G. GLOVER, VK3AG*

CONSTRUCTION AND OPERATION OF MODERN TRANSMITTER (Continued)

OUTPUT COUPLINGS (To Aerial and Feeder Systems)

The object of the coupling device is to transfer the maximum energy from anode circuit to aerial or feeder system with minimum loss. It is assumed for the purpose of this discussion that the rule governing L/C Ratio or "Q" Factor of anode tank have been observed, and that tank is to be operated at resonance with load reflecting pure resistance unless otherwise stated; therefore we are only concerned with matching impedance of aerial or feeders to tank. The efficiency of the coupling may be defined as the ratio of useful energy in the tank circuit to that available at the terminals of output coupling when terminated in a pure resistance. The writer employs the term "useful energy" with the object of eliminating from discussion the normal losses of tank circuit itself. In determining the total anode efficiency the latter must be taken into consideration; but here we are only interested in comparing the efficiencies of actual coupling circuits.

Figure 10 (a) depicts "Capacity Coupling," often referred to as "Direct Coupling." The capacitor in this case is tapped on to the tank coil at point determined by impedance ratio of anode and aerial circuits. In cases where the capacitor is connected "direct" to the aerial the tapping point is at high impedance point for voltage fed aerial, and should be tapped much further from the "cold" end of the tank than for low impedance current fed aerials. The principal disadvantage of this system is harmonics and parasitics introduced by the taps, and necessity for bringing the aerial itself right into the shack.

Figure 10 (b) shows how to overcome the harmonic and parasitic problems by employing separate inductively coupled aerial tank, isolated from anode tank by Faraday shield, and using L and C values which will give the correct impedance when optimum degree of coupling is employed.

The two methods of coupling dealt with so far are normally used only for mobile equipment where ease of installation is a prime factor. With the exception of single wire feed system, which employs single untuned feeder, other forms of feeding aerials involve the use of one of the following mediums: Co-axial Line, Co-axial Cable, Twin Cable or Twin Open Wire Line. The first two being known as unbalanced and the last two as balanced feeds. This subject will be covered more fully when "Aerial Systems" are under consideration.

*Glorad Engineering Services.

Untuned Coil

Figure 10 (c) depicts standard method of tight coupling open wire non-resonant line to anode circuit by means of small untuned coil. Loading in this case is varied by changing either the number of turns in the aerial coil, or the degree of coupling to anode coil. In order to cancel out residual reactance it is necessary to retune the tank circuit slightly.

Taps on Tank Circuit

Figure 10 (d)—A method which is often employed with open wire lines is to tap each line on to balanced anode tank coil, via a pair of block-capacitors, adjusting the impedance by moving taps to or from centre of coil while maintaining equi-distance in order to avoid upsetting balance to ground. As in previous case residual reactance is balanced out by readjustment of tank capacity. This form of coupling suffers from harmonic and parasitic bugs.

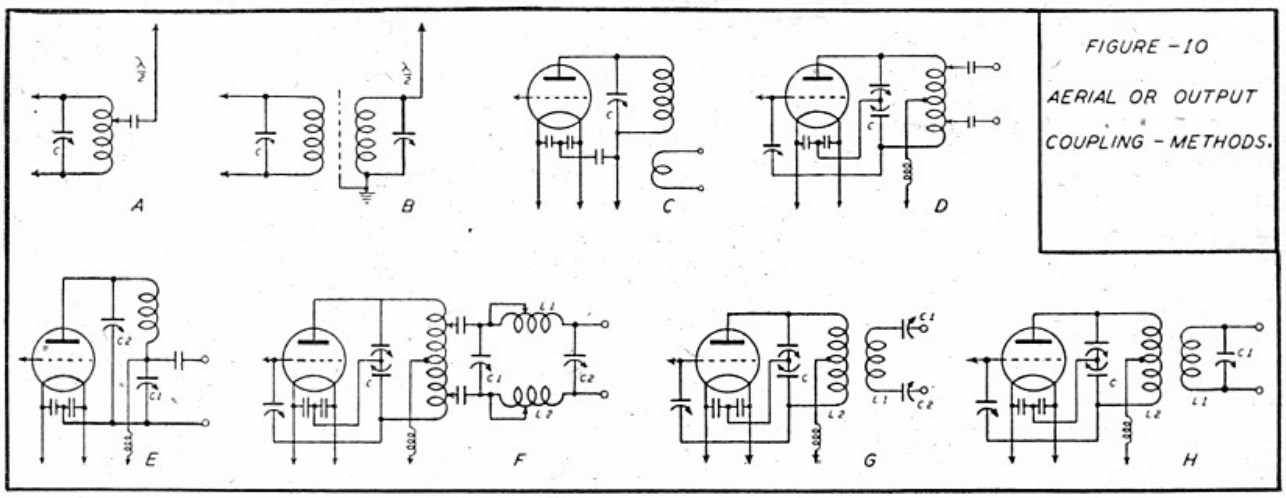


FIGURE - 10
AERIAL OR OUTPUT COUPLING - METHODS.

Pi-Section Coupling

This method, illustrated in Figure 10 (e), is employed in portable rigs where quick matching to wide range of impedances is essential. It is in effect a capacity voltage divider—C2 being readjusted to resonance every time C1 is varied. The usual method employed is to adjust C1 until anode current reaches the prescribed value at resonance, reducing the value of C1 increases impedance at output terminals. Relatively large value capacitors are required to give desired range.

Pi-Section Filter

By employing balanced low-pass filter shown in Figure 10 (f) matched coupling is possible between a fairly wide range of impedances. This method has in fact become very popular and when properly adjusted is most effective. Correct adjustment should be carried out as follows:—

First, having disconnected the filter from transmitter tank, tune latter to resonance, indicated by minimum anode current. Then guesstimate the positions of taps

on L1 and L2—the higher the frequency the less the number of turns required—replace input clips on balanced tank coil, equi-distant from the centre. (A balanced tank circuit is essential for twin lines.) C2 is then set to half scale and power applied, after which C1 is adjusted for minimum anode current. If the minimum value does not coincide with desired full load value, try new setting for C2 and repeat operation. If after exhausting all settings of C2 the anode current is still too high or too low, experiment with new locations of taps on L1, L2 and tank coil. **Tank capacitor must not be varied while lining up filter circuit,** and C1 must be carefully adjusted to **exact** minimum when final setting is reached, otherwise haramonics will not be minimised.

If difficulty is experienced in obtaining correct loading with resonant lines, vary the L/C Ratio of filter over much wider range than normally necessary.

Series Tuning

When tuned feeders having current loop at input end are employed series tuning as shown in Figure 10 (g) will effectively maintain balance of line to ground, while artificially adjusting length of feeders to resonance and cancelling out residual reactance. Tuning procedure is as follows:—

With C1 and C2 at minimum, loosely couple aerial (L1) and tank coils (L2), adjust tank capacitor to resonance (minimum anode current). After observing anode current increase C1 and C2 simultaneously for maximum anode current, re-resonate tank, and tighten coupling between L1 and L2; then repeat the whole operation until the required minimum current is reached.

Parallel Tuning

In some cases resonant lines are used with voltage loop appearing at the input end. Under these conditions parallel tuning as depicted in Figure 10 (h) can be employed, that is, coupling coil, tuning capacitor and line are all connected in parallel. Providing that the line is non-reactive aerial circuit may be tuned without upsetting the resonance of tank circuit. The frequency range of this form of coupling may be further extended by equipping L1 with tap. Tuning procedure is as for series tuning.

Link Coupling

From constructional point of view isolating aerial tuning networks from the transmitter by means of link coupling has much to recommend it. Particularly where push-pull unit is to be connected to an unbalanced feeder system, because one of the biggest problems is to get tubes to equally divide the load when capacity unbalance is reflected by coupling coil with one end at ground potential.

NEUTRALISATION

Neutralisation is one of the most important aspects of amplifier design and operation. Unfortunately many people have been lulled into false security by believing that the use of tetrode and pentode tubes eliminates necessity for neutralisation; however this view is entirely incorrect, as in spite of all the external shielding precautions one may take, there comes a time, or frequency to be more correct, when the grid-anode capacity of the tube provides sufficient positive feedback to cause self sustained oscillation. In fact, when such conditions do arise the very low value of capacity causing feed back is responsible for many headaches, due mainly to the difficulty of achieving an equally low value of capacity for feed back circuit.

Neutralisation might well be described as the process of introducing into the input circuit, by artificial means, sufficient negative feed-back to counter-act or neutralise positive feed-back provided by aforementioned grid-anode capacity of the tube. Not only must this feed-back be negative in character, but also it must be 180° out of phase, and equal in amplitude, to the cause of oscillation. That is the real nigger in the wood pile where low grid-anode capacities are involved, because of irreducible distributed inductance, distributed capacity and RF resistance introduced into the neutralising circuit by unavoidable length of necessary connections.

Anode Neutralised Circuits

When neutralising energy is fed back from the anode circuit as shown in Figures 11 (a), (b) and (c), amplifier is said to be "anode neutralised."

In the case of Figure 11 (a), circuit depends for its operation upon the extension of tank coil, and is satisfactory over a limited range of frequencies only, due to the fact that the amount of coupling between the two sections of tank coil is varied with the value of capacity C. In practice Cn increases as value of neutralising section of coil is decreased.

In Figure 11 (b) the tank condenser C is connected across the whole of the centre-tapped tank coil. Under these conditions Cn is approximately equal to grid-anode capacity of tube; however, neutralisation is completely effective at but one frequency, due to the unbalancing of tank by grid-anode capacity being placed across one half only. The effect of unbalance is further aggravated by the difficulty of locating tap at exact electrical centre of coil.

By employing balanced split-stator capacitor as in Figure 11 (c), plus small compensating capacitor across the lower half of same, to balance grid-anode capacity which is connected across the top half, complete neutralisation can be secured over a wide range of frequencies. In practice where value of capacitor C is very large, in comparison to grid-anode capacity, the compensating capacitor may be omitted without serious effect.

Grid Neutralising Circuits

Sometimes the neutralising voltage is taken from grid instead of anode tank. The remarks regarding unbalance discussed under anode neutralisation apply equally well to grid neutralisation. In view of the fact that grid neutralisation has many disadvantages as compared to anode neutralisation, especially in the case of modulated Class "C" amplifiers, we will not spend any further time on this subject.

Inductive Neutralisation

Figure 11 (d) outlines method of applying inductive neutralisation by employing links arranged to convey out-of-phase voltage from output to input circuits. The voltage induced in the grid circuit thereby cancelling effect of grid-anode capacity. When correct degree of coupling and correct phasing is employed complete neutralisation is obtainable, but only at frequency for which it is adjusted, owing to change in mutual inductance as frequency is varied.

Figure 11 (e) depicts another system of inductive neutralisation known as the "shunt method." In this case the inductance is shunted directly across the grid-anode capacity of tube via blocking capacitor C2, the latter merely isolating the anode DC supply from grid circuit. In practice neutralisation is effective only at resonant frequency of coil and grid-anode capacity.

Inductive neutralisation is particularly useful for tetrodes or high impedance triodes possessing very low values of grid-anode capacity.

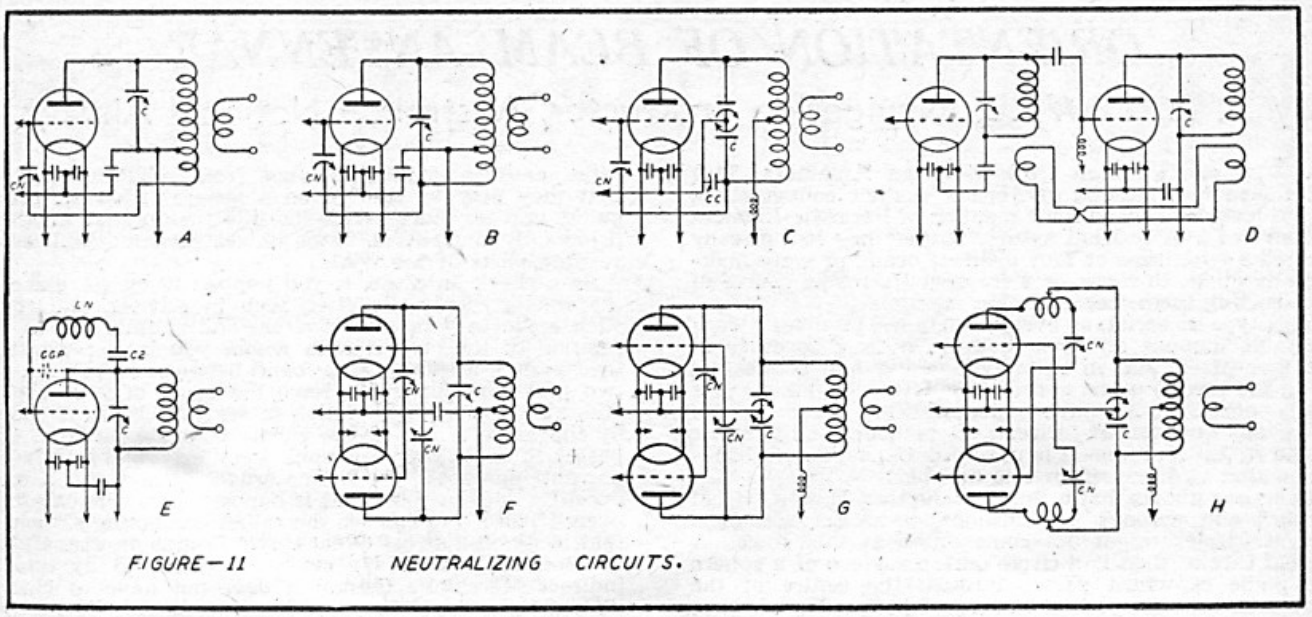
At V.H.F. a form of inductive neutralisation employing a resonant line as neutralising element, instead of coil, may be employed for operation at single frequency.

Push-Pull or Cross Neutralisation

In the case of push pull circuits depicted in Figures 11 (f) and 11 (g) the two neutralising capacitors are "cross connected" from tube to tube in the form of a capacity bridge entirely independent of grid and anode tanks. Except in cases where dissymmetry exists in lay out, neutralisation is completely independent of frequency. Circuit employed in Figure 11 (g) offers the best circuit balance by virtue of balanced split-stator capacitor used.

Frequency Effects

As the frequency of operation is increased, the necessity for absolute symmetry in circuit, and the employment of short leads, especially in neutralising circuit, becomes more and more apparent. The reason is not hard to seek. Distributed capacity and inductance of leads becoming very important factors in V.H.F. circuits. Input loading effects upsetting the phase relationship



FIGURE—11 NEUTRALIZING CIRCUITS.

make it difficult to completely neutralise the stage. There is much to recommend the naturally symmetrical push-pull circuit for V.H.F. work.

Neutralising Capacitors

Maximum, or should we say minimum, voltage rating of neutralising capacitor should be at least equal to the applied RF voltage plus the sum of DC components of anode and grid voltages, plus modulation where applicable. Capacity values will depend upon the circuit employed.

Figure 11 (h) illustrates circuit employing triodes in push-pull with parasitic bridge applied to neutralising circuit. Reference to the figure will reveal that the anode of tube and neutralising capacitor are connected at opposite ends of centre-tapped parasitic coil.

Neutralising Procedure

The methods employed in neutralising are fundamentally the same for all circuits.

Without anode voltage applied, but with filaments heated and grid excitation applied to stage to be neutralised (assuming that parasitics are not present) it should be possible to swing the anode tank capacitor through resonance without reflecting change in the grid current meter. Thus, by making use of this fact we can vary the values in neutralising circuit, in small steps, until correct neutralisation is achieved. It must be emphasised that it is essential to re-adjust grid tank to resonance each time change is effected to either neutralising capacitor value or neutralising tap on coil.

In the case of push-pull circuits the capacity of both neutralising capacitors should be kept as nearly the same as possible.

The reaction exhibited by single ended circuits employing split-stator neutralisation will depend upon the type of tube employed, for example, when tube has high grid-anode capacity the grid meter will indicate gradual rise and fall when anode tank is tuned through resonance, maximum indication will co-incide with true resonance when the circuit is completely neutralised.

A neon bulb may be very effectively employed both as an indicator of neutralisation and parasitic conditions. For the former purpose it is placed in contact with anode of tube during neutralisation process, when it will glow if neutralisation is incomplete, that is, of course provided driver has the necessary power. WARNING! Applying neon bulb to "hot" spot may give false results by unbalancing circuit, hence it may be necessary to slightly increase neutralising capacity after removing bulb in order to compensate for reduction of stray capacitance introduced by bulb.

When employed as an indicator of parasitic conditions it will be found that by running the bulb around the circuit elements, particularly RF chokes, nodes and anti-nodes may be indicated by reactions of bulb, thus enabling one to get some idea of the frequency of parasitic. In practice it is not unusual to find several waves standing

(Continued on Page 28).

ORIENTATION OF BEAM ANTENNAE

By E. P. L. WALL, Navigation Instructor, Australian National Airways*

Out of one hundred QSOs between Amateurs, 75% mentioned the question of Aerials in their conversation, and at least 58% made some mention of Parasitic-Element Systems of a directional nature. Either they had already erected a two, three or four element beam, or were making alterations to them, or were actually in the course of constructing them, before actual erection.

This type of aerial, as everyone knows, involves a considerable amount of work, both in putting together in the first place, and in suitably erecting and connecting up in the second place, and to complete one's labour it is really necessary to have some working ideas on the important question of "Direction" to bring one's labour to the fullest fruition. It is purely the question of Orientation that is discussed in this article.

Everyone knows that a Radio Wave travels on a "Great Circle," and perhaps a definition and description of a "Great Circle" might not come amiss at this stage. A "Great Circle" then is a circle on the surface of a sphere the plane of which passes through the centre of the sphere and divides it into two equal parts. **The shortest distance between any two points on the surface of a sphere is the smaller arc of the Great Circle joining them.** Thus the Equator is, in itself, a Great Circle, and so also are all the Meridians, running North and South, and of course there can be any amount of Great Circles running in any direction over the globe, provided that they bisect the earth equally into two halves.

A Small Circle, mentioned just by way of interest, does not cut the earth into two equal halves, and, as an example, any parallel of latitude is a small circle. As an example, slice the globe right through at the parallel of 40° South, and you will not get two equal portions, by any means!

Most of us are very familiar with the ordinary Mercators Projection of the World, one sees it everywhere; in books, atlases, advertisements and the like, and its main feature is that the Meridans are parallel on the paper from top to bottom of the sheet. Further, a straight line drawn beween any two places appears to the eye on a Mercator's Map to be the shortest distance between any two points, whereas in fact it is the longest, and, to follow this route the bows of a ship, or the nose of an aircraft never point directly to the objective until it is almost in sight!

In short, such a projection is totally unsuitable for measuring the direction of a wireless wave, either from or towards any given point! And furthermore, the orientation of a beam aerial based on measurements of direction from such a projection would be so much in error that the effect of building and installing a beam directional aerial would be quite lost, and all one's labour woud be in vain!

Thus the only correct method of obtaining exact orientation for a beam aerial is that of measurement from a specially drawn Great Circle Chart, these charts are known as Gnomonic Projections, as opposed to Mercator's Projections, and, of course are not generally obtainable, and are, furthermore rather costly.

I propose, therefore, to give a list of general Great Circle Bearings to most countries of the world, as taken from Melbourne. It may be stated that the result of using such Bearings from any part of Victoria would not effect their accuracy to any great extent, especially when taking into account that the final adjustment for maximum signal strength can be obtained from movement of the beam itself in the horizontal plane of 360°. Furthermore, despite the accuracy of the bearings given, varying conditions of locality and surroundings will, in individual cases, cause a slight difference from such bearings, so that they may be said to be a general good all round guide, and no more. It is for this reason that they are listed only in general terms of sections of countries in varying parts of the world.

As a check on these, if you happen to own a globe of the world, such as is often seen in schools, you could stick a pin in your own position and another pin in the position of the station with whom you intend working, then stretch a small elastic band between and across the two pins, and there you have the track of your signal, and, also, the angle at which to set your beam is shown by the angle at which the elastic cuts the Meridan that passes through your location. Very accurate results are not obtainable by this rather crude method, but a most excellent idea of just what is happening can be obtained. From it, also, you can see the rather conflicting statement that to fly on a direct Great Circle Course an aircraft has to continually **alter it's course**, whereas to fly on the indirect Mercator's Course it does not have to change its course, and yet is never heading directly to its destination, until the very last lap! These points are only mentioned in passing, as a matter of interest.

We now come to the list of Countries, with the approximate angle, as measured from TRUE NORTH, at which to set the beam in order to effect maximum communication strength, purely from the "Directional" viewpoint. If you have a globe, as I mentioned above, you will see, by using the method suggested, exactly what countries your signal will pass through, en route to the desired recipient, and, furthermore, knowing the direction of an ordinary single wire aerial, together with it's own radiation pattern, you will soon ascertain exactly what countries you can, under such fixed aerial conditions, work best, from the directional viewpoint.

Approximate Great Circle Bearings From Various Capital Cities

Country	Melb.	Syd.	B'ne	T'ville.	Adel.	Pth.
Canada, North	030	030	030	040	030	035
Canada, South	050	050	045	050	045	040
U.S.A., North	060	060	055	060	065	052
U.S.A., Central	070	070	065	070	070	060
U.S.A., South	090	075	070	080	082	070
Panama	115	100	100	120	105	130
S. America Nth. Half	130	130	125	130	130	170
S. America Sth. Half	160	150	155	155	160	180
S. America E. Coast	170	165	160	165	170	185
Pacific Is. General	040	070	060	080	070	070
Japan	355	350	345	345	352	015
Burma	310	310	300	300	308	340
India, North	300	300	295	290	310	325
India, South	290	290	285	280	300	312
Europe	295	320	310	300	320	315
U.K.	310	330	330	325	330	320
Africa, North	270	270	260	260	280	290
Africa, South	230	230	220	220	235	250

Bearings given as from Melbourne are sufficiently accurate for normal use in Tasmania.

Lastly we come to the very important point of determining the TRUE North, the point from which all the above bearings are measured in a clockwise direction. Without this knowledge the bearings, as given, are without value. The simplest and most efficient method is by the use of the Sun, at Noon, and by Noon, I do not of necessity mean 12 o'clock by the watch! As you know, Eastern Australian Standard Time is for the Meridan of 150° East, and thus our watches will not correspond to "Sun Time," even if we are situated on the 150th Meridan, simply because our watches cannot follow the aberrations of the sun in its 365 day cycle.

*10 Ontario Street, Caulfield, S.7

A few simple corrections, therefore, are required, to calculate the exact moment of NOON, by the Sun, so that the shadow, as it falls from any perpendicular erection, such as the corner of a house, the mast for your aerial, a telegraph pole, or the like, will give you the True North and South line, with unfailing accuracy—remembering, of course, that the shadow always falls SOUTH of the object, provided you are situated South of Latitude 23½° South of the Equator.

The first step in finding out the true alignment of North, then, by shadow cast by the sun, is to find the time by your watch, which is presumably set to the Standard Time of your State. Next, from an Atlas find the longitude of the position in which your station is situated—this should be easy enough, as it would be a very strange thing if you did not know your permament location.

Having obtained the Longitude, to the nearest 15 minutes of arc, get the difference between this and the standard Longitude for your State time, and multiply this difference by "4"—this will give you the difference in time. SUBTRACT this correction from 12 o'clock by your watch, set to Standard Time, if you are EAST of your Standard Meridan. ADD if you are West of your Standard Meridan.

Here is an example:—

Standard Meridan for Victorian time is	150°	E.
Your Station is in Essendon, Longitude	144°	55' E.
Difference	5°	5'

5° 5' × 4 = 20 mins. approx.

As you are WEST of 150° this correction will be added, so that as far as you have now gone, it will be Sun Noon at 1220 by your watch. There is, however, another correction which is supplied from the table below, and the final application of this correction will give you the exact time by your watch when the sun's shadow will align exactly on North and South. Here is the table:—

January	+ 6	mins.	July	+10	mins.
February	+ 3	„	August	+14	„
March	— 6	„	September ..	+ 7	„
April	—15	„	October	— 1	„
May	—14	„	November ..	— 3	„
June	— 2	„	December ..	+ 1	„

Thus to complete the problem:—

Watch Time	1200	Hours
Long. Correction	+20	(Because you are West of 150°)
	1220	
Month October	—1	
Final Time	1219	When shadow is True North and South.

In case you are not sure what the Standard Meridans of the various States are, they are given here:—

Queensland, N.S.W., Victoria, Tasmania	150° E.
South Australia	142½° E.
Western Australia	120° E.

Of course the alignment of your house, fence, streets, etc., will in most cases give you a true North and South line, but, if you are in doubt the above explanation will remove all doubt, I hope!

Here, then, are the rules again, in concise form:—

To Find Direction of True North by the Sun

(a) Set your watch to the correct Standard Time of your State.
(b) Find from an atlas the Longitude of your location.
(c) Get the difference between your own Longitude and the Longitude that is the Standard Time Longitude for your State, as given above.
(d) Multiply this difference by 4.
(e) ADD this amount to NOON by your watch if you are WEST of your State's Standard Meridan, but SUBTRACT it if you are EAST of your State's Standard Meridan.

(Continued on Page 21).

INTERNATIONAL PREFIXES

Many requests have been received for publication of the International Prefix List. We shall endeavour, from month to month to correct any alterations which may take place.

This list is merely a guide and does not claim to be correct. It is based on pre-war allocations and information gleamed from various recent international publications, DX contacts, etc. It is impossible to be accurate because of:—

1—The number of undercover stations using self allotted prefixes and calls, e.g.: YR5X, XQ4BB, PR4AA, YR5USA, RL and RV are one and the same station —from R.S.G.B., July 1946.

2—Recent alterations where countries have changed their sovereignty, and no recent information is to hand.

3—Divergence of opinion by hams in some localities where no governing body has issued licences as to the correct prefix to use.

4—Re-allocation of prefixes frequently, e.g. VS 3-4-5 JH.

AC4—Tibet
AR—Syria
C—China
CE—Chile
CM-CO—Cuba
CN1—Tangier Zone
CN8—Morocco (French)
CP—Bolivia
CR4—Cape Verde Islands
CR5—Port. Guinea
CR6—Angola
CR7—Mozambique
CR8—Port. India Goa
CR9—Port. Macau
CR10—Timor Island
CT—Portugal
CT2—Azores
CT3—Madaeira Islands
CX—Uruguay
D2—Germany, Brit. Zone
D4—Germany, USA Zone
EA—Spain
EA6—Belearic Islands
EA8—Canary Islands
EA9—Morocco (Spanish)
EI—Ireland
EK1—Tangier Zone
EL—Liberia
EP-EQ—Iran (Persia)
ES—Estonia
ET—Ethiopia
F—France
FA—Algeria
FB8—Madagascar
FD8—Togoland (French)
FE8—Cameroons (French)
FF8—Fr. West Africa
FG8—Guadeloupe
FI8—Fr. Indo China
FK8—New Caledonia
FL8—Fr. Somaliland
FM8—Martinique
FN—French India
FO8—Tahiti (Fr. Ocean.)
FP8—Miquelon and St. Pierre Islands
FQ8—Fr. Equator. Africa
FR8—Reunion Island
FT4—Tunisia
FU8-YJ—New Hebrides
FY8—French Guinea
G—England
GC—Channel Isles
GI—North Ireland
GM—Scotland
GW—Wales
HA—Hungary
HB—Switzerland
HC—Ecuador
HH—Haiti
HI—Dominican Republic
HK—Colombian Republic
HP—Panama
HR—Honduras
HS—Siam
HZ—Hediaz
I—Italy
I6—Eritria
J—Japan
J4—Brit. Forces in Japan
J8—Chosen (Korea)
J9—Marshall Islands
J9—Formosa (Taiwan)
KA—Phillipines
KB6—Baker, Howland Is. AM Phoenix Group
KG6—Guam
KH6—Hawiian Islands
KJ6—Johnstone Is.
KL7—Alaska
KM6—Midway
KP4—Porto Rico

KP6—Jarvis Is., Palmyra Group
KS6—Samoa (U.S.A.)
KV4—Virgin Islands
KW6—Wake
KZ5-NY—Canal Zone
LA-LH—Norway
LU—Argentine
LX—Luxembourg
LY—Lithuania
LZ—Bulgaria
MX—Manchukuo
NY—Canal Zone (U.S.A.)
OA—Peru
OB—Was in Sarawak area
OD—Lebanon
OH—Finland
OK—Czechoslovakia
ON—Belgium
OQ5—Belgian Congo
OX—Greenland
OY—Fareroes Is.
OY—Jan Mayen Is.
OZ—Denmark
PA—Netherlands
PJ—Curacao
PK1-2-3—Java
PK4—Sumatra
PK5—Borneo (N.E.I.)
PK6—Celebes & Molucca Islands
PK6—Dutch New Guinea
PX—Andorra
PY—Brazil
PZ—Surinan
SM—Sweden
SP—Poland
ST—Sudan
SU—Egypt
SV—Crete
SV—Greece
TA—Turkey
TF—Iceland
TG—Guatemala
TI—Costa Rica
U-UA-UK—U.S.S.R.
VE—Canada
VK—Australia
VK4—Also Papua
VK7—Tasmania
VK9—New Guinea
NO—Newfoundland
VP1—British Honduras
VP1—Zanzibar
VP2—Leward Is.
VP2—Windward Is.
VP2—Antigua
VP3—British Guinea
VP4—Trinidad & Tobago Island
VP5—Cayman Is.
VP5—Jamaica
VP5—Turks and Caicos Is.
VP6—Barbados
VP7—Bahama
VP8—Falkland Is.
VP8—Sth. Georgie Is.
VP8—Sth. Orkney Is.
VP8—Sth. Shetland Is.
VP9—Bermuda
VQ2—Nth. Rhodesia
VQ3—Tanganyika
VQ4—Kenya
VQ5—Uganda
VQ6—Brit. Somaliland
VQ8—Mauritius
VQ9—Seychelles Is.
VR1—Gilbert, Ellice, and Ocean Islands
VR2—Fiji
VR3—Fanning Is.
VR4—Solomon Is.
VR5—Tonga (Friendly Is.)
VR6—Pitcairn Is.
VS1—Sts. Settlements
VS2—Fed. Malay States
VS3—Non-Fed. Malay St.
VS4—Brit. Nth. Borneo, and Sarawak
VS5—Labuan and Brunei
VS6—Hong Kong
VS7—Ceylon
VS8—Bahrein, Khuria, & Muria Islands
VS9A and another letter—Aden
VS9K and another letter—Kamara
VS9P and another letter—Perim Island
VS9S and another letter—Socotra
VU—India
VU7—Bahrien Is.
W—U.S.A.
XE—Mexico
XU—China
XU4—Mongolia
XZ2—Burma
YA—Afghanistan
Y1—Iraq
YJ—As FU8
YL—Latvia
YM—Danzig
YN—Nicaragua
YR—Roumania
YS—Salvador
YI-YU—Yugoslavia
YV—Venezeula
ZA—Albania
ZB1—Malta
ZB2—Gibraltar
ZC1—Tranjordania
ZC2—Cocos Island
ZC3—Christmas Island
ZC4—Cyprus
ZC6—Palestine
ZD1—Sierra Leone
ZD2—Nigeria
ZD3—Gambia
ZD4—Gold Coast, British Togoland
ZD6—Nyasaland
ZD7—St. Helena
ZD8—Ascension Island
ZD9—Tristan Da Cunah
ZE—Sth. Rhodesia
ZK1—Cook Island
ZK2—Niue
ZL—New Zealand
ZM—Br. Samoa (West.)
ZP—Paraguay
ZS—South Africa
ZS3—South West Africa

DIRECT DISC RECORDING

PART IV: THE CUTTING HEAD.

(Based on a Lecture presented to the Sound Recording Institute of Australia by Mr. L. T. Garrioch.)

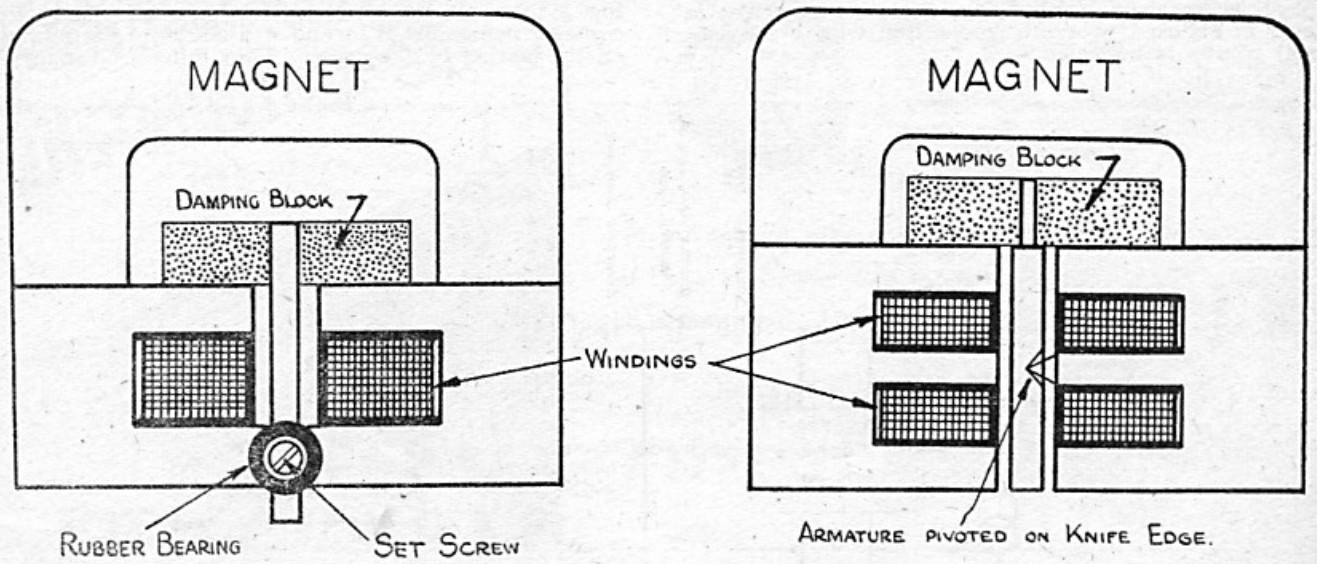
The preceding instalments of this article were published in the March 1946, May 1946, and July 1946 issues of this Magazine. Interested readers should refer to these three issues.

In the earlier articles of this series, little or no reference has been made to the term "Direct" disc recording, and this has been due largely to the fact that the subject matter has been applicable to all forms of disc recording. Now that the question of cutting heads has been reached, however, it becomes necessary to provide some insight as to the meaning of the term in order to describe adequately their action.

"Direct" or "Instantaneous" recordings are cut on discs which have been coated with Cellulose Nitrate, Gelatine, Casein, or some similar material which is sufficiently stable to withstand being played back by means of a normal reproducer. The action of cutting a disc therefore constitutes the whole recording process, and reproduction can be effected immediately this has been done. Commercial recordings, on the other hand, are cut into wax-coated discs which are subsequently electro-plated to form stamping dies from which a large number of plastic copies can be made. The wax recording is not sufficiently robust to enable the usual type of reproducer to play it back without damaging its surface.

The difference in the physical properties of these two types of recording media is a factor which also influences the design of a cutting head to suit each type of recording. It will be readily appreciated that a wax surface will offer negligible resistance to the cutting stylus, while those materials used for direct recordings will definitely resist it. The resistance offered by direct recording materials has two components—viz.: a tangential component due to the "drag" of the stylus through the material, which is largely influenced by the depth of the groove being cut, and a radial component which resists the side-to-side motion of the stylus when a signal is impressed on the disc. The first component is practically constant and is effectively borne by the cutting head carriage mechanism, so that it has no effect upon the finished recording. The second component however, does influence greatly the character of the recording by imposing a heavy damping load on the stylus excursions. It has the unfortunate property of not being constant, and varies both with the frequency and amplitude of the sound being recorded.

The cutting head is a device which transforms the electrical energy fed into it from an amplifier into mechanical energy, and in so doing it possesses certain properties like those of a band-pass filter. Such a filter requires a terminating impedance (which preferably should be purely resistive over the audio range being handled), and in the case of direct recording discs, this is partly provided by the damping effect of the disc material. (In the case of wax recorders, a tuned rubber tube is arranged to resist the movement of the armature, and this makes the resulting cutting head far less compact than those for direct recording purposes.) Since the damping provided by direct recording materials is only portion of the total required, additional damping requires to be included within the cutting head itself, usually in the form of small blocks of rubber or viscaloid which can be clamped with varying pressures against the armature, and so resist its motion.



Turning now to the more specific aspects of cutting heads for direct recording, we find that they fall into two distinct classes—viz.: magnetic and piezo-electric—and in each case they are closely analagous in general construction to their play-back counterparts, their principal differences being mainly in the matter of mechanical robustness and degree of internal damping.

Dealing first with magnetic cutting heads, it can be said that fairly satisfactory results can be obtained from the better grade magnetic pickups providing that certain adjustments are made. One of these is to tighten up the

rubber damping pads so that the armature is less free to move. This tends to flatten the frequency response curve of the unit by reducing the effect of armature resonance, etc. If the windings are of the high-impedance type suitable for feeding directly into the grid circuit of an amplifier, further improvement can be effected by replacing them with lower impedance coils. This also reduces the risk of accidental burn-outs during peak signal levels because of the heavier wire employed.

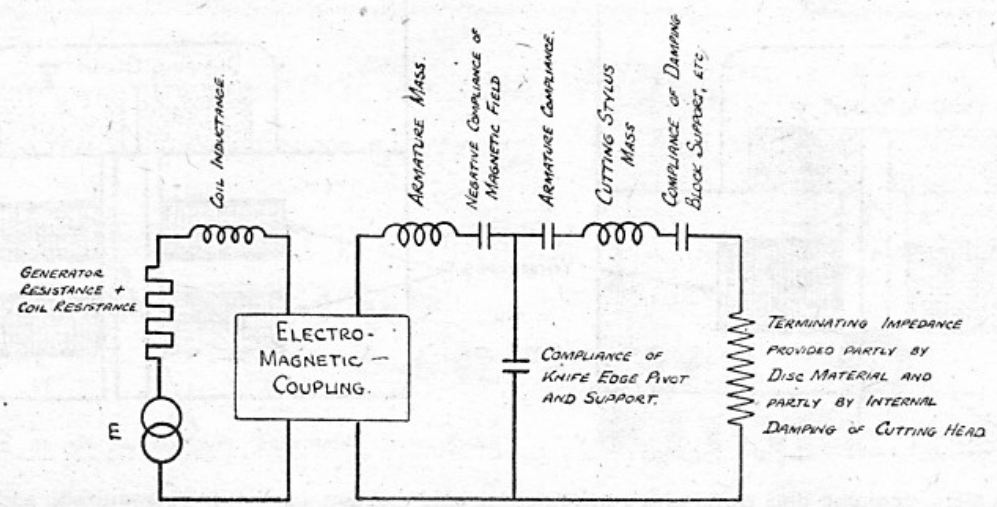
There is a limit however, to the improvement which can be secured from a converted device such as this, and sooner or later the progressive recordist will be forced to consider either the purchase or manufacture of a cutting head specifically designed for the purpose. The principal limitations occur at the higher frequency end of the audio spectrum (as is the case with all recording equipment), and one of the most prolific sources of such loss in cutting heads is the pivot about which the armature moves. In converted pickups, this pivot usually takes the form of a rubber lined journal bearing in the lower pole-pieces, and at higher frequencies the residual "give" is sufficient to reduce considerably the motion delivered to the stylus point. The cure for this condition is obviously to seek some positive pivoting method, and the most frequent choice in this regard is that of a hardened steel knife edge pressing firmly into an appropriate groove in the armature.

Another source of loss can be attributed to the unbalanced arrangement of forces acting on an armature which is pivoted at one end. Dynamical considerations show that the moment of inertia can be greatly reduced by arranging for the pivot to lie at the mid-point of the armature, and for the magnetic coils to operate with a push-pull effect upon **each** end of the armature. A typical arrangement embodying these refinements is shown in Figure 1, where a comparison with a conventional pickup is indicated.

when all these factors are considered, and it can be seen that impedance matching can exert a profound effect upon the resulting frequency response curve. For a cutting head of some given nominal impedance, it will be found that satisfactory performance can be secured with amplifier output impedances which are above and below this figure, but that the frequency response may be different for each. Generally speaking, if the amplifier output has a lower impedance than that of the cutting head, there will be a tendency to accentuate the lower frequencies at the expense of the high frequencies; the reverse effect can be observed when the amplifier output has the higher impedance. This fact may prove useful when making final adjustments to a recording system for optimum frequency response, but must be applied intelligently as serious mis-matching can cause serious loss in the efficiency of power transfer, or, worse still, can introduce distortion.

Magnetic cutting heads are inherently constant-velocity devices, and as will be remembered from the introductory article of this series, this means that the amplitude of the cutting stylus excursions will decrease by half with every octave by which the frequency is raised when the sound energy level is kept constant. The need to modify the lower frequency end of the spectrum so that a constant-amplitude characteristic is followed, has already been discussed, and with magnetic cutting heads this is usually done with equalizers either within, or following the recording amplifier. Since there is a normal tendency for the cutting head response to fall slightly at the lower frequencies, the equalizers should be designed to give only the degree of attenuation which will yield a uniform fall of 6 DB per octave as originally described.

The second class of cutting head, namely those employing a piezo-electric crystal element, were widely used overseas before the War, and will no doubt again appear on the market in due course. They differ from magnetic



Matching the cutting head to the amplifier is the next item for review, and while it is usual to refer to cutting head impedances as "so many ohms," it must be remembered that this rating is purely nominal in character, and that the true impedance varies widely with frequency, and probably to a far greater degree than in the case of a dynamic loudspeaker. The various mechanical parts of a cutting head, their relative masses and compliances, and the interaction of magnetic fields involved, sets up a complex situation with regard to the resulting input impedance, which is therefore not merely governed by the inductance and resistance of the exciting coils, as might at first be thought. In Figure 2 is shown a possible equivalent circuit of a balanced-armature cutting head

heads in one very interesting respect, and that is that they are inherently constant-amplitude devices. This means that for making records for reproduction by conventional reproducing devices, they require appropriate equalizing to modify their performance and yield a constant-velocity characteristic. Without such modification, the recordings would be sadly lacking in bass response unless the play-back system were suitably equalized. (Note: There are certain advantages attending constant amplitude recording, however, and it is hoped that these may be reviewed later in this series.)

The construction of crystal cutting heads is generally similar to that of torsion-type crystal pickups, but of a more robust nature. The crystal element is usually of

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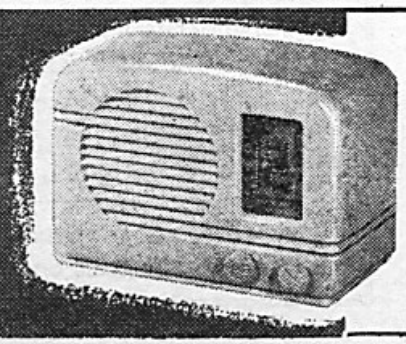

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4-ply construction and its inherent stiffness provides the necessary damping during recording. The arrangement from an electrical point of view is essentially that of a condenser, and as a result its impedance is capacitative and decreases as the frequency increases. The frequency at which the amplifier output matches the cutter impedance determines the "cross-over frequency," above which the response will be constant-velocity, and below which it will be constant-amplitude. If this frequency is chosen towards the upper end of the frequency spectrum (say 6000 C/s. or above), we have the unit operating as a constant-amplitude cutter. If the frequency is chosen close to 250 C/s., we get the conventional recording characteristic.

The determination of the output transfer secondary impedance to give any desired cross-over frequency is very simply done by considering the crystal cutting head as a pure condenser. Taking its internal capacity as 0.005 mfd. (a fairly representative figure), its impedance at 100, 400, 1000, and 5000 C/s. will be respectively 318000, 79000, 318000, and 6370 ohms (as calculated from the well-known formula: $Xc = 1/2\,Pi\,f\,C$). Then for a cross-over at say 400 C/s. we merely make the secondary impedance of the transformer 79600 ohms.

Such an impedance is high for the general run of output transformers, and may lead to difficulty in use. In view of the good sensitivity of crystal cutters, however, it is possible to gain the desired impedance match by using a series resistor to help build up this figure, while permitting the use of a lower secondary impedance in the transformer. The usual practice is to distribute the desired total impedance equally between the two.

Where constant-amplitude characteristics are desired, simple parallel-feed from the output tubes of the amplifier may be used, provided that the plate impedance of the tubes does not exceed about 4000 ohms (measured plate-to-plate, if it is a push-pull stage).

Crystal cutting heads suffer one possible disadvantage, namely, fragility. A magnetic head can certainly be burnt-out, but care and patience can do much to help in rewinding it. A crystal which is "busted" through overloading, stays "busted," and one merely has the option of either nonchalently tossing it out, or nailing it to the wall as a warning to future generations. However the precautions against such disasters can be readily applied, and protective circuits are simple to instal.

The first Golden Rule is to keep DC potentials off the cutter terminals, and likewise between either terminal and the (usual) metal case. Nor should the unit be subjected to temperatures above 125°F. (Hay and Booligal Hams please note!) Operating voltages should not exceed 250 volts RMS, with 500 volts as the limit for instantaneous peaks.

Constant-amplitude recording rarely gives any trouble in this respect, as average modulation can usually be secured with as little as 50 volts RMS applied to the terminals. However when cross-over frequencies between 250 and 800 C/s. are used, about 150 volts RMS are required, and the margin of safety is therefore much reduced. (A fairly linear operating voltage relation exists between these two extremes if other cross-over frequencies are chosen.) Protective circuits normally employ glow-lamps of the neon type arranged to bridge the cutter-circuit at some point where the voltage is likely to rise sufficiently to cause ionisation. It may be necessary to arrange several such lamps in series so that they do not break down before the maximum overload voltage is reached, in which case equalising resistors of about one megohm should be bridged across each of them (in much the same way as is done with electrolytic condensers in series), in order to equalise the voltage drops.

A final word should be directed to amplifiers before concluding this chapter. The varying impedance of all types of cutting heads has been somewhat stressed in this article, and this makes triodes output tubes the only

(Continued on Page 28).

FEDERAL AND VICT. QSL BUREAU

Interesting details of the activities of Danish Amateurs together with particulars of band restorations and power restrictions are to hand from the E.D.R. Postboks 79 Copenhagen, K. Writing under date of August 31, the president (OZ8T) states that the power limitation has been raised from 5 watts in the antenna to fifty watts input. Band restorations are similar to our own with the exception that the 3.5 Mc/s. band has not yet been restored. Telephony however is not permitted on the restored portion of the 7 Mc/s. band, and only within prescribed frequency limitations in the other bands. 28 Mc/s. activity is very great and week-end activity with telephony on this band is reminiscent of the pre-war days on the 3.5 Mc/s. band. Practically all OZ experimenters incline towards suppressor grid modulation. Portable and mobile operation is permitted only in the 58-59 Mc/s. band with exemption for hidden transmitter hunts—a popular radio sport in OZ.

Jeff Mason (VK5VC, ex-VK3VC), writing from Millicent, S.A., complains that the high QRM level on the DC mains there, renders all DX inaudible and has confined his activities to local and Interstate contacts on the 7 Mc/s. band.

AC4YN, Reg Fox, British Political Mission, Lhasa, Gyantse P.O., Tibet, via Calcutta, in a note covering the despatch of a bunch of VK cards states that his station is the only one in that country and is naturally much sought after by foreign Hams, each one wanting a QSL. Reg claims it would be financially impossible to QSL each one direct so therefore he must use the Bureaux as a means of distribution for QSLs. He adds "I don't know how many Hams there are in the world but they all want a QSO with AC4YN." Do you blame them?

In reply to a letter seeking clarification of the VS1 situation, R. Price of the Radio Signals Club c/o. A.L.F. Signals, Singapore, S.E.A.C. states that up to the time of writing (14/10/46) the only callsigns issued fall within the following limits: VS1AA to VS1AK and VS1BA to VS1BZ. The stations signing VS1FB and VS1QB are unknown to his club.

The vacation dates of the Federal QSL Manager, shown in November "A.R." were put back a fortnight by the incidence of the transport strike in Victoria and consequently extended to the end of November. These notes written on 7th November, are being penned from Walhalla, where the writer is pursuing the elusive yellow metal. From the surrounding heights he is "almost" in optical and audible range with VK3WE, the "old man of the mountains." All these preliminaries are a lead up to an apology for the brevity of this month's notes.

Cards handled at the Federal Bureau during October represented an all time high for inward cards—over 4,000 being put through, so much so that enlarged filing containers had to be constructed for VK3 country and VK3 metropolitan cards. The continued growth in traffic is accepted as a tribute to the efficiency of the VK Bureaux but further growth will necessitate one of the locals being co-opted as an assistant—VK3RJ.

FEDERAL HEADQUARTERS.

Federal Executive is keen to apply itself to the establishment and advancement of standards of amateur radio, both technically and administratively. We believe that if a goal is set for amateurs to reach in their methods of operation and experimentation, the fraternity will achieve merit and recognition which it would not have done otherwise. We mention this just briefly so that you may know what is contemplated, and if you have any ideas for the advancement and improvement of amateur radio, do not hesitate to communicate with us at any time.

BREAK-IN OPERATION

We received a number of queries recently regarding interpretation of regulations, and we are advised by the P.M.G. Department that break-in operation is permitted subject to the requirements concerning identification and time limitations. In the case of break-in phone transmissions, the carrier must not be maintained unmodulated. In other words, phone transmissions should be "push to talk."

We also received a ruling which permits a licenced amateur operating another amateur's station in the absence of the owner, on condition that the owner takes responsibility for the operation of his station by the visitor. The owner's station call sign is to be used, not the visitor's call sign.

50-54 Mc. ACTIVITY

We have a report that VK3HK has been heard in Queensland on the 50-54 Mc. band, also that two Sydney stations were heard recently on this band in Melbourne. It seems that this band can do with a lot of experimenting. How about some more amateurs trying it? (See Stop Press in 50-54 Mc. Notes—Editor.)

BADGES

Lapel badges have been ordered and we expect early delivery, so keep your fingers crossed!

EDITORIAL.

once to Federal Executive who takes the matter up with the Chief Inspector of Wireless. In a typical case recently, when that procedure was adopted, the matter was cleared up in 24 hours. If the case is a reasonable one, and not a case of deliberate law-breaking (which the W.I.A. will not handle), you can expect an immediate decision one way or the other.

Most of the troubles have concerned transmitter components, and the power for which stations are licenced. Here are the facts.

You can, and always have been, able to use individual components including tubes, condensers or transformers with ratings in excess of your licenced power, provided your transmitter is not deliberately designed to operate in excess of that power. For example, if you have obtained an 813, through Disposals, there is no reason why that tube cannot be used with a "B" class licence, provided the transmitter is not built to operate that tube at its full rating. Nor do you require special permission to use it. That has been the situation for 20 years and it differs not one iota today.

Many adverse criticisms have been received that the troubles are caused solely by the broad general wording of the Regulations. With this we disagree, and would cite the experience of the Australian Amateur in the "between wars" period. Then we experienced no trouble of the type under review, and on the contrary, through a kindly Administration with a liberal interpretation of the Regulations, found the situation a favourable and satisfactory one.

Our panacea is simple, and proved by results—exercise reasonable restraint and patience on the one hand, and use your Institute to handle your case on the other, should you be the recipient of a chit which you consider not in line with the intention behind a Regulation.

V.E.M.

RAMBLINGS ON THE DX BANDS

Now that we have received most of our old bands back, the 28-30 Mc. band is no longer the sole DX band, and in consequence it has been decided to eliminate the special section previously devoted to this band.

The future policy will consist of the doings on the various DX bands.

We received from VK2 two long lists of DX worked on the 28-30 Mc. band and the 14 Mc. band. While it has been the intention to publish these lists, this now becomes impossible due to their length. VK2ADT seems to spend all his time on the air as his list comprises of 240 DX contacts which does not include VK and ZL contacts or repeated QSOs. Harry Hawkins, VK2YL, is another who must spend considerable time on the air as his list totals 214 stations and all in one month!!!

Roy Jonasson, VK3ND, of Castlemaine, writes: "This is rather a belated letter but as time is very fully occupied, I don't have much time on the air. The average is about six hours per week and those hours spent at probably the worst time of the day for 14 Mc., which band I am concentrating on at the moment. As I still have my gear among the cups and plates my activities are seriously restricted. Shortage of building material has prevented completion of the shack and as I find the best hours for 14 Mc. here in Castlemaine are between 5 and 7.30 p.m. I have to give way to the inner man. Under present conditions the transmitter is a top the kitchen cabinet with a 15 feet link to the antenna tuner on the kitchen sink hi! I have spent quite a lot more time listening than operations and hear lots of DX, too long a list to itemise. Conditions as I find them here are patchy. Usually I hear a lot of Europeans around five to six o'clock and have worked quite a few especially Gs, which are easy to raise every Sunday afternoon. The past few weeks at different times I have heard a lot of Africans just after 12.30 a.m. coming through FB and managed to work a few. VEs are very regular and of course the Ws very regular. From the north, J, CR, and XU usually about after 9 p.m. but a bit hard to raise. South America seems the hardest for me to raise and just missed W.A.C. in four hours operating last week-end as over that period I had worked G6CJ, PA0UN, XU1AW, CR9AN, VE7ZM, VK6DJ, VK4DO, several Ws, ZS6BS, ZE1JI and hooked LU7AZ but lost him in the QRM in the second over after calling him three times.

"I do hear quite a few VK3s and VK7s on 14 Mc. but none seem to answer my calls hi! I also helped VK3AIR back on the air at Kyneton. Niel Ireson is an old timer with a new call and will be on 14 Mc. with a small 18 watt c.c. two stage job I lent him. Unfortunately the crystal I lent him doesn't allow him to operate on 7 Mc. under present restrictions. Our old friend 3RG apparently giving the game away here at Castlemaine. I used a lot of persuation but to no avail. Gil says he hasn't time to spare and is more interested in 200 meters stuff I think. Gordon Wyneton of course is away in Japan and I don't expect to see him for some months unless I can contact him through some of the J boys.

"The rig I am using is still the three stage job with 807 final, running about 35 watts. The antenna is two half waves in phase with ¼ wave feeders and does a good job. Erected in the form of a wide V with about 38 feet clearance at each end down to 18 feet in the centre, running N.N.E. and S.S.W. The receiver is a 7 tube super, EBF2G, ECH35, 6AC7, 6K7, 6F6, 6C5 B.F.O. and 5Z4. It does a good job on 7 and 14 Mc. and as yet to be tried out on other bands. I expect to be on fone within a week or two now with series modulation, as I have the modulators partly built. Refrigeration keeps me pretty busy at this time of the year and doesn't mix too well with

radio. On 18/11/46 at from 10 p.m. to 1.40 a.m. the 14 Mc. band was really open. Contacts made were VQ3, VQ8, GW3, ZS5, ZE1, ZS6, PK6, VS1, XZ2, Ws. South America only place not heard. I will be forwarding a bunch of cards along in case the boys are getting anxious."

VK3YV, Harold Wohlers in Wangaratta says: "Re the letter published under "DX of the Month" from VK3YP. I would like to inform him that his notes on 28-30 Mc. are very much appreciated by 3JK and myself. The reason why I have never sent in any reports for these notes is I never seem to work a Ham that "Patto" hasn't already reported. The notes so far published by 3YP, 3CP and 5NR are excellent and certainly makes one envious. Once again I wish to express my appreciation to them and should I ever be lucky enough to land some "very juicy ones," I will certainly drop you a line.

South Australia reports that countries heard on 28 Mc. last month included VA, XZ, F8, G, VS1, VU, VE, YZ, ZL, J9 and KA. Countries heard on 14 Mc. included J2, KA, XE, G, ON, VS1, OZ, XU, VA, KZ5, F8, J9, CX, YV, FM8, VP9, PK6, HK, ZK, TG, TI, VR, LU, VP5, XZ, HC, EI, CR, YR, OK, HB, and SM.

50-54 M/cs.

Active in Melbourne on this band have been VK3s HK, YS, ABA, ZD, QO, AFQ (who has shifted his QTH to the neighborhood of Maribyrnong), NW, GG, KU, YJ, MJ, AJH, BW, and LS. 3YJ is having some trouble with BCL QRM on 50 Mc. and it must be admitted that BCL interference can be quite bad on some of these higher frequencies. The signals appear to be picked up on the grid or grids of the audio tube or tubes and after rectification, pass through. By passes on the grids often effect a cure or low resistance suppressors in series may be beneficial. One wonders whether it may be still worse at 166 Mc.! However we hope you get the trouble eliminated shortly Jeff so that you can take an active part in the game. 3AJH is a new comer to the Ham game and is to be commended for having his first QSO on 7 Mc. and his second on 50 Mc.!! Apparently 7 Mc. didn't look too good Jack, eh? Well you wont be troubled by QRM on 50 Mc. Jack is using crystal control and puts out a nice signal locally, but due to antenna problems, has not got out very far as yet. Bon, 3GG, now has his beam up plenty high, 43 feet we believe, and his signal is now one of the loudest on the band.

Quite a number of country chaps are threatening to break into the band: 3QC, 3NK, 3DI, 3TA, 3KX, 3IZ, and a number of others, and great interest is being shown by them.

On Saturday, 16th November, a small field day was held. Fred and Jim (3YS and 3ABA) both took their portable to Macedon and 3NW took his outfit to Mt. Donna Buang. Stations contacted from both these locations included MJ, GG, LS, QO, KU, HK, BW and CO (operating on 7 Mc. and listening on 50 Mc.). Signals at all points were R9 to R9+ and the contact between the two portables (60 miles) resulted in R9+ signals both ends also. Unfortunately 3IV, from Ballarat, was unabe to go to Mt. Buninyong, so that we were not able to make what would have been a 100 mile contact. However 3NW had his eyes on some of the higher mountains further out such as Mt. Buller, which should yield results.

As yet no sign of the band opening for longer distances. W1AW is transmitting at 7, 8, 9 and 10 a.m. E.S.T. for 10 minutes and listening thereafter for 10 minutes periods each day and we would urge those that are in a position to listen to do so.

VK4 have responded to our appeal for notes from Interstate and the Editor hopes they will be forthcoming each month in future. The following VK4 Hams are on, almost nightly, and during the daytime at week-ends: VK4s AW, RY, XG, FB, ZU and HR. All rigs are crystal and the receivers mostly supers. They have found vertical antennas the best for cross-town contacts—as yet no DX has been heard! On a recent Saturday afternoon the 50 Mc. gang had a little excursion around the town in 4XG's car, calling in and inspecting the "works" at each shack. They were surprised to find liquid cooled bottles in the rigs at a couple of the shacks. Had never heard of tubes bearing the name of XXXX myself!

STOP PRESS — FLASH !!!

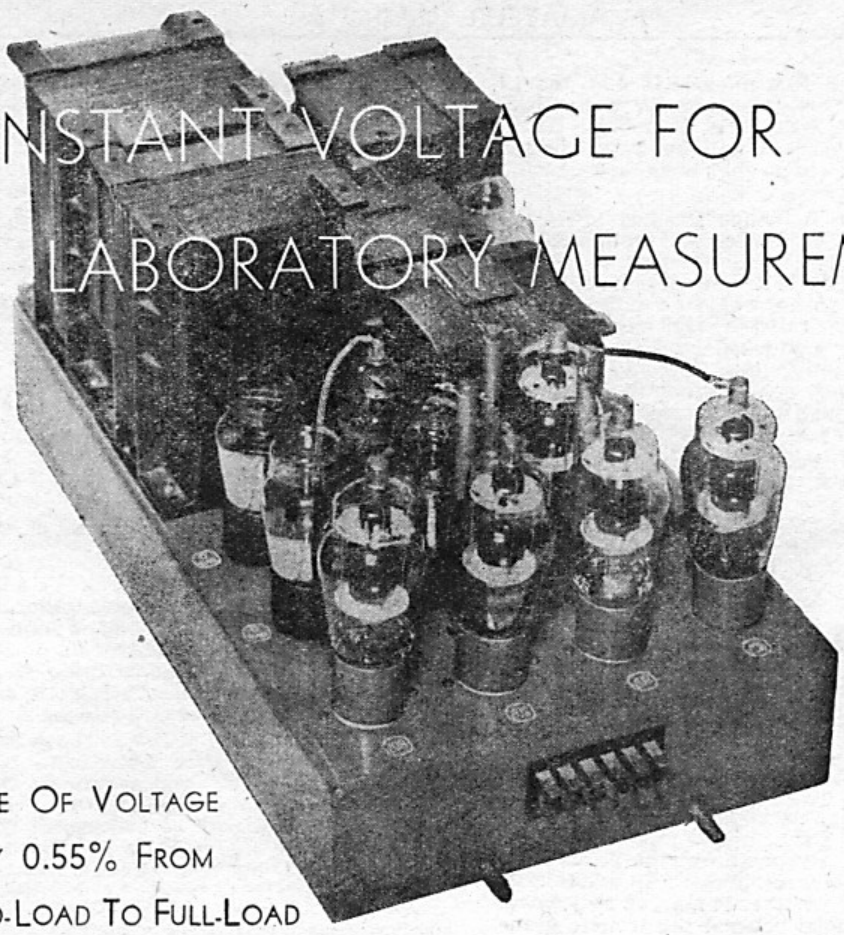
The 50 Mc. band has at last opened up and VK3s have made a number of contacts with VK2s and VK4s with excellent signal strength both ends.

The first signs of the opening appeared on Saturday, 30th November, when 3HK, operating portable at Croydon, heard VK4ZU testing at about 6.45 p.m. Signals were Q5 R5 and lasted about three minutes. 4ZU was also heard by 3PK (a regular listener), of East Kew, at the same time. On Sunday, 1st December, 3HK heard a VK2 for 20 seconds at 8.12 p.m. R5/6 and 4ZU again at 8.20 p.m. for 30 seconds at R6. VK3MJ heard a VK2 at 8.25 p.m. Advice was received that VK2WJ had heard 3HK at R8 and that 2OC, of Wyong, had heard him at 20 DB over R9 at about 7.15 p.m. on Sunday. With these results the 50 Mc. band enthusiasts were properly on the go and excitement ran high to see when a contact could be made and who would be first to make it.

This honor fell to VK3MJ who was on the job at 6.30 p.m. on Thursday, 5th December. He heard the automatic CQ of VK2NO and as soon as Don stopped to have a listen Dave called him and the first Interstate 50 Mc. QSO in history was accomplished. 2NO's signals were Q5 R5/9 and 3MJ Q5 R8/9. Shortly after this 100% contact, 3MJ hooked VK4HR for the first VK3-VK4

(Continued on page 28)

CONSTANT VOLTAGE FOR LABORATORY MEASUREMENTS



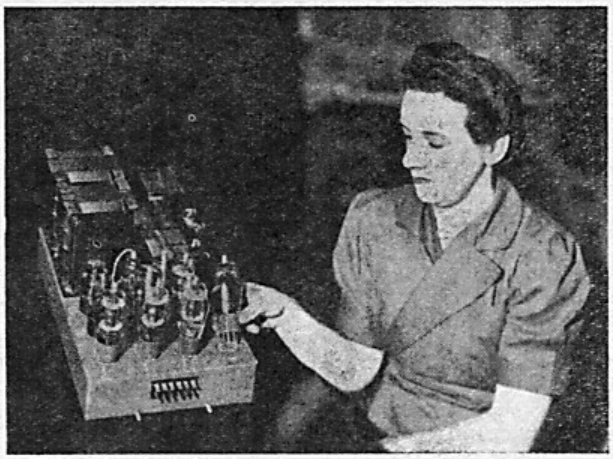
CHANGE OF VOLTAGE ONLY 0.55% FROM NO-LOAD TO FULL-LOAD

MANY testing processes require constant voltage to be applied to valves or other equipment during the time that the test is in progress. It is useless to have instruments correct within 1% or less if the voltage is going to vary while the current or other feature is being read.

This is particularly important in the testing of radio valves in which some of the characteristics are critically dependent upon the applied voltages. An example of this is the Characteristic Tester recently constructed in the Laboratory of Amalgamated Wireless Valve Co. Pty. Ltd. at Ashfield. This equipment is used for the checking of a percentage of all valves manufactured each day, to see that the accuracy of the factory testing is maintained, and to carry out other tests not normally applied to the whole production owing to their complexity.

The equipment uses an electronic voltage regulator on the plate, screen and grid supply voltages. The input is from the 240 volt A.C. mains, the output is variable in voltage from 0 to 300 volts with a maximum current of 200 mA. With the maximum output voltage, the percentage voltage drop is only 0.55% for a change of load from 0 to 200 mA.

The equipment uses Radiotron type 807 valves, four of which carry the current of 200 mA. between them. The 807 is probably the most satisfactory type of valve for this purpose owing to its high current capability (72 mA. per valve maximum) and its high amplification factor. This is only one of many applications in which Radiotron type 807 may be used with every satisfaction.



Radiotron

MADE IN AUSTRALIA

IN REVIEW.

EDDYSTONE COMMUNICATION TYPE 504

From the Birmingham works of Messrs. Stratton and Co. Ltd., Manufacturers of the well-known range of "Eddystone" radio equipment and components, comes the latest addition to the communication receiver line, the "Eddystone" 504 Communication Receiver.

The basic circuit of this receiver is a 9 tube superheterodyne using two R.F. stages, frequency converter, two I.F. stages, with crystal filter, combined A.V.C., second detector, and audio amplifier, noise limiter, beat frequency oscillator, output tube and rectifier.

The tuning range of the receiver is from 10 meters to 500 meters (30,000 Kc/s. to 600 Kc/s.), in five overlapping switched bands.

The tuning control is fitted with a special vernier indicator, and the gearing reduction ratio is 140-1, giving an effective scale length of 36 inches.

Sensitivity.—It is claimed that sensitivity is better than 2 micro-volts input on the highest frequency range for an output of 50 milli-watts.

Selectivity.—Crystal out—30 DB down at 5 Kc/s. off resonance; crystal filter in—30 DB down at 500 cycles off resonance, and 50 DB down at 2 Kc/s. off resonance.

Image Ratio.—

At 20 Mc/s. the image ratio is 35 DB down.
At 10 Mc/s. the image ratio is 50 DB down.
At 5 Mc/s. the image ratio is 60 DB down.
At 2 Mc/s. the image ratio is 75 DB down.

Output.—The output of the receiver is greater than 3 watts. Provision is made for either the connection of a speaker of 2.5 to 3 ohms impedance or high impedance headphones.

Input Impedance.—The aerial input circuit is arranged to match an average co-axial feeder.

S Meter.—The S Meter is calibrated in S units and above S9 in DBs. Each S unit corresponds to a change in carrier level of 6 DB.

Construction.—The receiver is fully tropic-proofed. The die-cast panel and chassis assembly ensures extreme rigidity of construction which enhances the stability of the receiver. The finish is battleship grey with an attractive blue panel. All fittings are chromium plated and the entire set presents a very attractive and unobtrusive appearance.

Dimensions.—Overall width 16¾ inches. Depth, 10¼ inches. Height, 9 inches. Weight, 40 lbs.

Further information on this receiver, and on all other "Eddystone" parts can be had by contacting Mr. R. H. Cunningham, at Messrs. Keith Harris and Co. Pty. Ltd., 51 William Street, Melbourne.

BEAM ANTENNAE.

(f) Apply the correction from the table for the month.

(g) With your own watch set to the correct standard time for your State, the interval you have now just calculated will give you the time by your watch when the Sun's shadow is due South of any vertical object.

You can then make a baseplate for your beam, arrange for a pointer, and place the baseplate in the correct orientation that you have found from the sun's shadow, and the orientation of your beam is solved, once and for all.

Slight local aberrations will be found in many cases, but at least you will have the satisfaction of knowing that you are with 95% accuracy of the correct direction.

As remarked upon before, although these corrections and directions are worked out for Melbourne, they will be reasonably correct for any other part of the State, and not seriously out for other districts.

May you get added DX with better orientation!

FREQUENCY ALLOCATIONS AVAILABLE FOR USE BY AUSTRALIAN AMATEURS

3500 Kc.— 3800 Kc.	50 Mc.— 54 Mc.
7000 Kc.— 7200 Kc.	166 Mc.— 170 Mc.
14000 Kc.—14400 Kc.	1345 Mc.— 1425 Mc.
28000 Kc.—30000 Kc.	2500 Mc.— 2700 Mc.
	5250 Mc.— 5650 Mc.
	10000 Mc.—10500 Mc.

DIVISIONAL NOTES.

NEW SOUTH WALES

Secretary: Peter H. Adams, VK2JX, Box 1734 G.P.O. Sydney.
Meeting Place: Science House, Gloucester and Essex Streets.
Meeting Night: Fourth Friday of each month.

Friday, 25th October, was the date of the monthly general meeting of the Division, held at Science House. The attendance was a large one, extra seating being required to accommodate some late comers. Mr. John Moyle, 2JU, was in the chair. Visitors included two Hams who motored down from Newcastle especially to attend the meeting, and 2OJ from Albury. We were particularly pleased to welcome our Federal President, Mr. Vaughan Marshall, 3UK, who happened to be visiting Sydney on a business trip. On a motion passed at the previous meeting, the business of the evening was given over to a discussion of amateur "politics," including matters such as the Regulations and their effect on amateur radio as a whole. After considerable debate it was obvious that the general feeling of the meeting was that the regulations, as they existed, were badly in need of amendment. Many of the regulations were so badly drafted as to apparently contradict each other. Some of them were ambiguous and incapable of being reasonably enforced. On the whole, they imposed such a barrage of restriction on amateur activity as to seriously hamper useful work. The operation of the Advisory Committees was also discussed, the general feeling being that these should be somewhat more democratic in their nature.

The presence of the Federal President was most appropriate at a meeting of this nature, and after much debate, the Chairman invited him to address the meeting. In his typical, racy style, Vaughan was able to give first-hand information on the activities of F.H.Q. in most of the matters which had been raised, and to assure those present that positive effort was being made to have them remedied. He outlined the difficulties encountered by F.H.Q. in conducting negotiations, which by their nature, could not be concluded overnight. In concluding he stressed that the best way any amateur could help the Institute in its job was to become a member, and to see that ohers did the same. Inasmuch as the Institute's voice was powerful in direct proportion to its membership, "he who was not with us was against us." At the conclusion of the meeting, the Chairman assured Mr. Marshall of the Division's fullest support for the efforts of F.H.Q. in obtaining better conditions for the amateur, and in consolidating the Institute.

It has been decided that the distribution of Disposals equipment on hand, including co-axial cable and some of the valves ordered some months ago, will be undertaken at the next general meeting, to be held on 22nd November.

The December general meeting, to be held on 20th December, will probably be devoted to a showing of films dealing with radar equipment as used by the Services during the last war. These films have been made available by the R.A.A.F. which used them widely for instructional purposes.

At a recent Council meeting, Mr. Don Reed (VK2DR) was co-opted as Asst. Secretary, in order to relieve the

Secretary in his efforts to cope with the large amount of business which seems to increase as time goes on. Don is not without experience in Institute matters, and should be a great help to the Council.

Efforts are being made to arrange a Field Day to be held at Wyong in the latter part of January. The assistance of Owen Chapman has once again been solicited, and it seems likely that another enjoyable event will take place according to schedule. Details and final arrangements are on the way. We hope that this, our first post-war outing, will be well supported.

A new set of A.O.C.P. classes have commenced under the leadership of Mr. Jack Howes, the Class Manager. Anyone interested is invited to write to him at the P.O. Box 1734 G.P.O., Sydney.

Coalfields Zone

Conditions improving generally on 28 Mc/s. though 14 Mc/s. very patchy at the moment. 2XT—Still not active but talking of building new shack and beams, etc. 2YO—Operating 14 and 7 Mc/s., though no information regarding George's activities. 2KZ—One of the reliables exclusively on 28 Mc/s. with his share of contacts. Max always a good QSO. Has intentions of making a few improvements, has been toying with fone. Max makes a habit of getting around the local shacks now and then to keep a personal contact. 2DG—Keith operating 14 Mc/s. only, has DX up to 60 odd mark; been trying new antennas and uses fone at times. Keith put some time into the contest but work prevented full time operation. 2TY—Bob just back from a holiday to VK4 and consequently not much activity at home for month. 2LB, 2MK and 2PZ only heard occassionally and nothing to report. 2ADT—Still getting the usual DX on 28 and 14 Mc/s. with occasional bursts on 7 and 3.5 Mc/s. 28 Mc/s. is Jack's pet band and has DX up to 57 countries. In one calendar month from the time of writing previous notes Jack has had 355 contacts. 28 Mc/s. DX is 53 countries as follows : fone 43 and CW 10—besides four countries additional on 14 Mc/s., making up his total of 57 post-war, not bad for a single 807 and 30 watts. 2YL—No alterations, mainly on 14 and 28 Mc/s. with sufficient DX contacts to keep 2ADT busy. With Jack 2ADT, enjoyed our visit to the last W.I.A. meeting, and hope to make the trip again soon.

Newcastle and District

All Hams in this zone are active and every phase of the game is being covered by different numbers. Some research on 50 Mc/s. is being carried out by 2CI, 2OC, 2BZ and 2AHA. 2BZ and 2AHA have had no difficulty in contacting one another but so far have not made contact with any "DX." 2OC at Wyang has been listening to the Sydney boys on 50 Mc/s. and transmitting on 3.5 Mc/s. Understand he has heard quite a few of the gang including 2NO, 2LZ and 2WJ. There has been great activity on 28 Mc/s. and those who have gone to the trouble of erecting rotary beams have been well rewarded with some nice DX. Sunday, 20th October, between 1900 and 2300 hours is considered the best period ever experienced for European contacts and well over 100 contacts were made by members of this zone. Old timers from 3.5 Mc/s. will remember 2KQ, Jack, who used to operate old 2CR from Tamworth. He is now active on 3.5 and 7 Mc/s. from Toranto. 2ZC, who probably has the best outfit in VK is active on all bands. He has some nice recordings of some phone contacts giving him a prominent record of another WAC on phone. 2AGD has been active on 28 Mc/s. George has push-pull T20s with three element rotary. He has well over 40 G contacts. Old timer, 2FP, very active on 28 Mc/s. with single 807 and rotary. Ernie has made WAC. Frank Torrant has been active on 28 Mc/s. with his old call 2UF. Has had some receiver trouble but is OK again.

Lionel Swain is now "ashore" after much service with the Senior Service. Reliably reported to be drilling many

holes so maybe 2CS will be heard soon. Lou MacDonald, 2WU been active on 28 and 14 Mc/s. and as keen as ever. 2KB active with a new outfit and was heard working a ZS at 2 p.m. on 14 Mc/s. fone. 2AMM active on 7 Mc/s. 2AEZ now at Gasford after many years with R.A.A.F. Ernie has been heard on 14 Mc/s. 2OE at Foster has been heard working 28 Mc/s. DX. 2PA has been active on 3.5 Mc/s. fone from Port Macquarie. 2XQ active on 28, 14, 7, and 3.5 Mc/s. at week-ends. Anxious to contact zone members in order to obtain first-hand news for this publication.

VICTORIA

Secretary: R. A. C. Anderson, VK3WY,
Box 2611 W, G.P.O., Melbourne. WM 1579.
Meeting Night: First Tuesday of each month.

BUSH FIRES EMERGENCY COMMUNICATIONS IN VICTORIA

In response to a request by the Lilydale branch of the Bush Fire Brigade Association, members of the Technical Advisory Committee have been devoting much of their time in assisting to establish an emergency communication network in the Lilydale district. It is desired that communication be established from any point in this area (about 200 square miles) to central control station, located at the police station, and that the equipment be so designed that a technically qualified man would not be needed to operate the sets. The T.A.C. considered that the most suitable set that was readily available, the FS6, could be altered without much difficulty to meet the requirements of the Bush Fire Brigade and the R.I., and recommended that three sets be purchased.

The FS6 has a really good battery receiver and a two stage transmitter (M.O.P.A. with 807 in final) with provision for grid modulation. Preliminary tests with these sets in the City area were not entirely satisfactory, so that it was with some misgivings that we set out for Lilydale on the morning of October 27 with two FS6s, VK3WI portable and a Teleradio set, secured by Jack Groves, from the Research Lab., complete with call sign VL3AA and frequency 4310 Kc. for this occasion. Securing this frequency was very fortunate because it fell within the normal range of the FS6 which would have required altering to enable them to work on either 7 or 3.5 Mc.

The party comprising Jack Groves, 3GU, 3BD, 3PW, 3JI and 3JO arrived at Lilydale about 1000 hours and proceeded to instal FS6s in various trucks. The Teleradio and one FS6 were installed in the Police Station and 3JO took 3WI portable along with him just in case the FS6 didn't get through. Four trucks with FS6s installed were to proceed along different routes, stopping first about one mile out to "net" with the C.C. Teleradio, and then at any point along their particular route where it was suspected that contact with cenral control might have been difficult and at every half hour, wherever they might be, to contact control.

This programme worked very well and a perusal of the logs returned shows that in practically every case contact with good signal strength was obtained by all the portables with control from distances as far as ten miles away, though the FS6 at control was not heard at all well. This was later found to be due to a defective aerial lead and when corrected, signals from the FS6 were received at good strength by the portables. Only one case of two portables contacting each other was reported, but, generally, it was not possible to hear other portable sets. This, however, is not a disadvantage as it is intended that all messages from portables are to be handled by central control.

The antenna systems used, in the case of the portables, were about 10 or 12 feet vertical and so arranged that they could be readily erected. At control a longer horizontal aerial was erected. At times during the afternoon

reception at control was impossible because of interference from nearby electrical equipment.

The tests proved that the FS6s, even as they stand, could do the job, but that desirable alterations would be to change to crystal control (to satisfy the R.I. and prevent any trouble in making contact with control because of off frequency operation), to abolish the grid modulation and instal cathode modulation (the modulation percentage with grid modulation is very low and the higher percentage to be obtained with cathode modulation could make the difference between getting messages through or not making contact at all), to simplify the controls of the set so that any one, whether technically qualified or not, can put the set into operation and get results. It is also desirable that the set be as water tight as possible so that a burst hose or mis-directed jet of water could not put it out of action. Another difficulty is that of noise, both A.F. and R.F., when the set is operated in close proximity to a water wagon with pumps running.

At the moment of writing a definite frequency allocation, 4660 Kc., has been received, and plans for the alterations having been completed, the actual work will be commenced as soon as crystals and modulation transformers are available.

Now Lilydale district is only one of many in Victoria and it is easy to visualise that very shortly such radio communications networks will be established in all other districts. **This is a huge undertaking and it is little wonder that the Country Fire Authority is looking to the Hams for assistance in such things as servicing the sets, where possible operating central control during emergencies and tests and, in short, establishing an auxiliary which they could approach for assistance in overcoming radio communication difficulties. An emergency network amongst the Hams throughout Victoria has been suggested and the sooner this gets under way, the better. Any member (metropolitan or country) willing to help in any of these ways is requested to write without delay to the Secretary of the T.A.C. stating the particular branch of activity in which he is best able to assist.**

QUEENSLAND

Secretary: C. Marley, VK4CJ,
Box 638 J. G.P.O., Brisbane.

Meeting Place: State Service Building, Elizabeth St., City.

Meeting Night: First Friday of each month.

Attendance at the October general meeting was smaller than usual, for some unaccountable reason. Keith Schleicher (4KS) spoke at length about efforts to secure Disposals gear for Hams. 4KS, 4RC and 4JU have spent a great deal of time in an endeavour to get on to gear, but it seems that the Amateur is not in the race against business interests. However, we got on to a limited number of tubes and any country men desirous of purchasing same can contact 4SN, c/o. Box 638J, G.P.O. Brisbane. The tubes available are IM5, 1K7, and 1C7.

We featured another showing of films last month, one dealing with teleprinter operation being particularly interesting. A number of the local gang have been hard at it during the contest, 4RC being rather consistent. 4HR, with 86 countries, is not leaving much by the way side and 4AP on 28 Mc/s. seems to be working them in the old AP style. The QRM from power lines has proved a stumbling block for a lot of the City Hams, who cannot hear those juicy ones because of the racket.

We are advised by the P.M.G's. Department that a new callsign list is in preparation and should in fact be available about the time this appears in print. Hams who have changed QTHs during the war might do well to remind the Department of the fact. Also, we advise once again that non-members who wish to claim cards from the QSL Bureau can have them by forwarding a stamped addressed envelope.

For all his old friends, Sandy MacPherson (VK4MC) advises that he will be back again on the air shortly. Mac is a keen bowler and has won several championships. Would like to pit his skill against other VKs with kindred spirits. We will have to match you with 4RQ OM!

On Sunday, 17th November, VK4XG conducted some tests on 50 Mc/s. from the Maleny Ranges. A portable generator delivered 25 watts input to a rig using an 832 in the final. The location was about 60 miles from the city, and the Brisbane boys did some listening. 4ZU was also listening on a portable receiver at Cape Moreton, about 35 miles from Brisbane. At time of going to press the results were not to hand.

Country news this month comes via 4SN who reports as follows: 4HK, Harry and the boys in Cairns, are anxious for disposals gear. (Have already related the sad story OM) Harry very interested in W.I.A. doings and writes regularly to country representative 4SN. Would like other country men to follow suit. 4EA, Eric, keen to get new rig going. That's the spirit Eric, will watch out for your sigs! 4OK, Jack and George, put out FB QRP fone on 7 Mc/s. Uses a 1D4 to modulate a 6V6G. They expect to be using an 807 and new power supply soon. Good luck boys! 4RQ, Bob, helped the local BC station get on the air after a disastrous fire. How about a little activity at 4RQ Bob? 4LN is putting out FB fone on 7 Mc/s. What about that letter OM. 4CU, Charlie, putting FB fone sigs in here at Tamborine Mtn. Heard on most Sunday mornings. Let's have some dope on the doings OM. How's V.H.F. work? (Yes, how it is? —4ZU). 4SN, Frank, wants to hear from country men. All letters welcomed and will be sure of a reply, so what say boys? Contact him on 7150 Kc/s. fone or CW. 4HZ now has a FS6 but is having trouble feeding the antenna. Any suggestions welcomed by Jim. And for country men, 4HA puts over any dope on Sundays at 7 p.m. on 3.5 Mc/s. band.

SOUTH AUSTRALIA

Secretary: E. A. Barbier, VK5MD,
Box 1234 K, G.P.O., Adelaide.
Meeting Place: 17 Waymouth Street, Adelaide.
Meeting Night: Second Tuesday of each month.

The monthly general meeting of the W.I.A. took the form of a visit to the School of Mines Radio Section, where an inspection of apparatus associated with the training of Naval Radar Mechanics was undertaken. More than one hundred, visitors and members, comprised the party and one and all agreed that a very pleasant and instructive night had been spent. It was to be regretted that any practical demonstration of the principles of Radar could not be attempted owing to the severe electrical storm which was prevailing at the time.

The results of activity during the week-end DX contest showed that either the amateur is not ready for such a contest or that prevailing conditions and QRM proved insurmountable. Pre-war contests even with the extended frequencies then in use were considered as endurance contests and with our present restricted frequencies it has become almost impossible to work for any length of time. Many amateurs came on for short periods to give the DX stations a contact and even so, extreme difficulty was experienced in exchanging ciphers.

The Wireless Branch is to be congratulated on its list of Experimental Wireless Stations issued last month. This publication, which is available at the enquiry counter, is probably the best of these lists so far issued.

The U.H.F. amateurs have recommended to the Council that the proposed field day be postponed until the new year. Examinations, transport, and storage of "B" batteries being main reasons for recommendation.

A surprising number of failures in "Regulations" were reported from the last A.O.C.P. examinations. This is difficult to understand as "Regs" are printed in black and white, cannot be altered in text, nor is there anything tricky in any of the questions. It behoves intending amateurs to give serious consideration to the Regulations section, for without them chaos would soon reign on the amateur frequencies.

The U.H.F. gang in VK5 decided to hold a meeting and see what could be arranged to make the proposed field day a success. The meeting unofficially opened on a Saturday afternoon at the Windmill Hotel and concluded rather hastily when two constables asked Bob Manuels (VK5RT) whether he thought it was time to go home to tea. Bob offered to discuss folded "dipoles" with them but seeing that the policemen did not appear very interested he was reluctantly led away. The meeting officially opened on Tuesday, 22nd October, at 8 p.m., at the QTH of George Bruce (VK5GB). It was a terrible night, rain starting to fall about 6 p.m., and by meeting time it was coming down in torrents. Joe McAllister and the writer arrived a few minutes early and found George looking very dismal, and all agreed that we would be lucky if any more Hams arrived on such a night.

Apparently we underestimated the enthusiasm of the U.H.F. boys because by 8 p.m. the following Hams and enthusiasts were gathered in 5GB's shack: VK5s QR, RT, KZ, RQ, GF, CR, PS, Messrs. Bartlett, Gaslaf, Bergen and McAllister. George Bruce was appointed the Chairman and the meeting was soon under way. In the manner of all Ham meetings extreme difficulty was encountered in trying to keep the discussion on the field day. On the slightest provocation 5RT would turn toward any subject except the main one, and just as we were preparing to muzzle him, he started to discuss field days in general and all was well.

Ten o'clock came and with it Charlie Cheel (VK5CR) who looked as if he had been cycling up and down the River Torrens. The meeting was now forced to adjourn inside the house owing to Reg Galle (VK5QR) nearly being electrocuted making room for Charlie. When we were ushered into the house we were greeted with a nice supper provided by George's XYL, to which the boys did full justice. No trouble was found in keeping the conversation going and about 11 p.m. it was decided to close the meeting. Joe McAllister made a gem of a

speech thanking Mr. and Mrs. Bruce for their gesture although some of his words were a trifle blurred through having to compete with a sausage roll.

The meeting then broke up and reformed immediately in George's shack and as far as I know it may still be going on. Joking aside, it was worth going out in the rain to see the keenness and enthusiasm of the U.H.F. gang in VK5, and if Hams will venture out in such weather just to talk "shop," then a U.H.F. section of the W.I.A. (VK5 Division) appears to be called for to enable them to gather together at least once a month. The writer intends to submit this to Council and feels sure that they will give it their earnest consideration. He would like to refute the suggestion that he was so full of cake and coffee that he had to be assisted to the tram. After all he has to look after his figure!!!

Members of the Council recently were the guests of the I.R.E. at a screening of technical films dealing with radar. The gesture of the I.R.E. was appreciated, as was the supper provided at the conclusion of the screening.

It was with sincere regret that the resignation from the Council of George Luxon (VK5RX) was accepted. George who is with the P.M.G's. Department finds shift work interferes with the Council meetings but will still be able to carry on as the QSL officer.

Mr. Hal Austin (ex-VK5BN) has been appointed to fill the vacancy on the Council created by the resignation of Mr. George Luxon (VK5RX). Hal is too well-known in Ham Radio to need any introduction and will be a decided asset to the Council.

Enthusiasm ran high at the last general meeting when the Treasurer (Mr. C. H. Baseby, VK5BZ) was presented with his first W QSL card, post war. Mr. Thomas (VK5IT) in making the presentation was quite overcome, but his last words were lost in the terrific burst of cheering from the assembled members. Membership of the VK5 Division has now reached an all time of 263 members and no sign of a let up in applications. It was agreed at the last Council meeting that provision should be made for the reception of visitors at the General Meetings, yours truly was appointed official host to the visitors at all meetings. I am not sure whether it means wearing any distinguishing uniform or not, but please, no cracks about Host Holbrook!

Who was the Ham who rode his bicycle to the last general meeting and chained the cycle by its back wheel to a post, only to find on his return that someone had detached the bike from its back wheel and moved on. Disgusting.

Apparently every State in VK has its "dillpot" brigade who, by their actions when on phone, do more to discredit the amateur than any other two faults put together. We have a couple of "Beauts" in VK5 and whilst any Ham is entitled to act and do as he likes on the air providing he breaks no regulations, at the same time the Ham today is on a much higher plane than pre-war, and it would be a pity for an odd Ham or so to bring us into dis-credit just because he wants to play broadcasting stations. Whilst on the subject might I say that a DX station may be experiencing difficulty with his English, but at least he can be understood and certainly does not expect a reply in pidgin English. This sort of thing is unpardonable.

WESTERN AUSTRALIA

Hon. Secretary: H. B. Lang,
42 Ord Street, Claremont, W.A.
Meeting Place: Builders' Exchange, St. Georges Ter., Perth.
Meeting Night. Third Monday in each Month.

The November meeting unfortunately has had to be cancelled due to the absence of lighting and more particularly the transport problem. The strike (now in its

second week) may or may not continue for some time. The next event of importance is the Dinner to be held on Friday, 6th December. All members will be circularised as to the time and the place, and it is to be hoped that by the time the date arrives both lighting and transport troubles will be solved. An excellent evening's entertainment has been arranged and the Committee responsible for the arragnements have left no stone unturned to ensure the evening being an unqualified success.

It has all the trimmings to suggest a real Xmas Party and we expect to see a real bumper attendance. Between now and then we hope that sane reasoning will prevail in the negotiations for an early return to work of the Railways and a complete lifting of the blackout.

Western Activity

The old saying goes "once you do a thing it's easy." Evidently this is correct or VK6 would be led to believe so, as not content with being WAC fone on 14 Mc/s., VK6KW calls and works three South Americans within the hour on 28 Mc/s. fone on the morning of November 3. Oh yes, other stations were calling them too. I feel sure every active VK6 on 28 Mc/s. was calling but NDG. They just got tired of it and went back to the job of chasing extra points in the contest. Congrats Ron and we hope you get plenty more.

VK6RU—Jim had a hard time getting his three element rotary up for the contest. Nearly lost same but it's now a going concern. As yet untuned due to the strike and no power being available. Maybe you will get it done before Xmas Jim.

VK6HL—Very busy converting his rotary into a three-element array. Has hopes of getting it tuned during one of those brief periods when we get power for three hours.

VK6EV—Yet another convert to the close spaced rotary. John managed to get his up for the contest and finished the job just in time. There were plenty of Europeans calling you John so that beam must be beaming

VK6DD—Not heard much lately. I believe John has been down with a real bad attack of flu. Best wishes for speedy recovery John and hope to hear you soon. (When we get power, hi!)

VK6WH—Still as consistent as ever. Ted keeps the 7 and 3.5 Mc/s. bands well and truly open in this State. Maybe you will have more company soon, Ted.

VK6RF—Very consistent CW both on 28 and 14 Mc/s. and seems to get some nice DX contacts.

VK6DJ—Heard Bill calling CQ contest so guess he has a very respectable score. Bill is a snappy operator and if the DX was there you may rest assured he will be in the running.

Getting these notes together is somewhat of a problem this month. No power so no can listen. However our country brethren are active and will therefore keep VK6 on the map. With such members as 6HT, 6WZ and 6EL known to be active we are looking forward to hearing of their efforts in the DX contest.

VK6WS—Has almost completed his new dual 28 and 14 Mc/s. three element rotary and expects to really go after the DX as soon as it's up and going.

6CM, 6DN, 6KB, 6MB, 6FC all very consistent on CW though did not hear them calling in the contest—why fellers?

VK6HS—Has just completed his 8JK rotary and is now waiting on power to give it the works.

VK6FL—Also bemoaning the fact of no power, enjoyed first week-end of contest, but the second—the least said the better. He hopes to have three element 14 Mc/s. up soon.

VK6RG—Lost his "plumbers' delight" in recent blow. Will soon have array up again correctly tuned and fed with co-ax. Maybe those Gs will come back now Ross.

VK6MW—Still busy but not on the air. You have an excellent opportunity to finish the house now Bill, whilst these power restrictions are in force.

Conditions in VK6—well don't ask me. I wouldn't know. Anyway, when those Railway guys go back to work and the power comes on, the air around Perth will be just "burnin' up." I know—I'll be one of them.

TASMANIA

Secretary: J. Brown, VK7BJ,
12 Thirza Street, New Town. 'Phone W 1328.

Meeting place, Photographic Society's Rooms, 162 Liverpool Street, Hobart.
Meeting Night: First Wednesday of each month.

Council meetings are now being held on the Friday night nearest to midway between general meetings and until we can procure a club room they will be rotated around the shacks of the Council members, this enables business to have much more time devoted to it and leaves the normal meeting night free for general meeting business, excepting any urgent matters that may arise. This has become necessary owing to the rapid growth of the Division and the amount of business being handled.

The first meeting under this arrangement was held at the secretary's home on 18/10/46 and looked like developing into a mothers' meeting from the chatter that followed the business. Business has priority? Decidedly, but after!!?? All joking aside though, this system has much to commend it for amongst other things it brings the Council together bi-weekly thus expediting urgent business handling and maintaining closer contact generally. Present were 7BJ, 7CJ, 7CT, 7CW, 7LJ and 7RF. Apology from 7PA. L. Jensen (7LJ) was in the chair and the time devoted to business far exceeded that possible under the old system.

November general meeting was held at the rooms on 6/11/46, present were L. Jensen (7LJ) in chair, J. Brown (7BJ), C. Walch (7CW), T. Connor (7CT), M. Loveless (7ML), R. O'May (7OM), R. F. Gee (7RF), T. Allen (7AL), D. Watson (7DW), R. Conrad (7TR), D. Hildyard (7DH), G. Richardson (7GR), A. Allen (7PA), Koglin, Clarke, Nielson, W. Watson (7YY), K. Kelly (7LL), Lipscombe, Durkin and R. Harrik. Apologies from A. Finch (7CJ), Moore, C. Oldham (7XA), S. Dahl, A. Morrisby (7VJ), F. W. Medhurst (7AH). Correspondence from F.H.Q.—Differentiation in licences, etc., and P.M.G's. Department re revision of regulations, etc. Outward to F.H.Q. was dealt with. On the motion of 7AL, seconded by 7DW, correspondence as read was received.

Two new Associate Members, Trebilcock and L. Durkin were elected unanimously.

General Business.—7LJ advised the meeting that he had arranged a schedule with 3ZC on Wednesdays and Fridays each week at 7.30 a.m. to handle any W.I.A. traffic, this met with general approval. Copies of proposed Federal Constitution were tabled for members and certain items were selected for immediate discussion. Some caused lively discussion and a number of alterations and revisions were suggested, after a fuller study there should be more interesting views at next meeting.

Our first Field Day since reorganising is scheduled for Sunday, 24th November and weather permitting, promises to be a bumper turn out, 7BJ is to man the transmitter and 10 a.m. is Zero Hour, with three hours of operation. First prize is a meter presented by 7CW, 2nd prize a donation by 7AH. As the run is open to non-members a special prize for first non-member to come in unaided is being donated by 7TR. A vote of thanks to these members was proposed by 7LJ, seconded by 7PA and carried.

The subject set down to follow the meeting deviated from the usual technical one, W. Watson (7YY) giving a talk on his experiences as wireless operator aboard small coastal vessels and elsewhere which was much appreciated.

There is a fair amount of activity amongst the local gang judging by the QSLs I saw distributed last meeting. S. Dahl was seen in Hobart recently but no news of his doings. 7JH has struck the field day, it being his week-end out from Waddamana, says he hopes to enjoy the thrill of the hunt. He is on the air with a small rig at last—T.N.T. with room for additions, he does not want to overload Wadda Station yet. He is contacting a few Ws, etc., and would welcome a call from any of the gang. Arthritis in the feet is keeping him pretty close to the chair at present (some circles suggest it's gout?). In the North an interesting lecture on U.H.F. Therapy was given by Mr. Chris. Cullinan, Engineer of 7EX recently to which W.I.A. members were invited. 7BQ and 7LZ both are active in Launceston on 14 and 7 Mc/s., 7BQ is using fone. The northern gang had a visit from the R.I., Mr. Carroll, recently, and found no complaints with their treatment. This bears out our own experience here in V.I.H. Orders of Disposals Equipment are gradually coming to hand, wonders will never cease.

RECORDING.

logical choice if best results are to be obtained. Pentodes and Beam-Power tubes are likely to prove very disappointing if any substantial power is to be delivered to the cutter, unless some form of negative feedback is employed. Commercial practice favours triodes, and the 2A3 tube seems to be first favorite, either as a simple push-pull stage, or as parallel-push-pull where heavily damped cutters are to be used. The average power requirements for cutters vary from a humble 2 to 3 watts for a simple cutter to 8 to 10 watts for a highly damped professional cutter, but ample margin should be included to take care of peaks, particularly where orchestral works are involved.

50-54 MC.

contact. R9 this time. 3GG, 3HK, 3YS, 3LS, 3YJ and 3NW were on the job and many contacts were made. At the time of writing full details have not yet reached me (3NW) as to all the contacts made, but 3MJ worked 2NO, 2WJ, 2AZ, 2AHF, 4HR and 4AW. 3HK worked 2NO, 2AHF, 2WJ, 4HR, 4RY, 4XG and 4ZU. The writer (3NW) worked 2WJ, 2AHF and 4ZU. 3YS and 3GG are known to have made good contacts and 3LS, 3BW and 3YJ, who were on the band, probably got their share.

Conditions on the whole were good although all the signals were fading fairly badly and varying as much as 6 or 7 R points. Few contacts were lost, the band remaining open for nearly two hours. So far as is known no contacts were made between VK2 and VK4.

CLEARING THE ETHER.

on RF chokes, indicating that the frenquency of parasitic is several times greater than the natural resonant frequency of choke and allied circuit.

Another form of indicator used for neutralising is a loop consisting of a few turns of wire coupled to anode tank coil, and employing as indicator a pea lamp, R.F. thermo-coupled milliammeter, or diode operated DC milliammeter. This form of indicator should be coupled to the "cold" end of coil, and the degree, of coupling should be minimum required for effective indication.

Inability to completely neutralise circuit indicates stray coupling introduced by bad design, layout or construction.

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WANTED.—One CV6, will exchange one EF50, RL18 or VR136 for same. H. Voake, 22 Jessie St., Coburg, N.13.

EXCHANGE.—0-30 DC Voltmeter, Weston type 301, or 0-10 Amp. Meter, Weston type 301, for AC Voltmeter 0-10 or 0-15. L. E. RADCLYFFE, Patent Office, Canberra.